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Native American Telecommunication Independence: One Step Above Smoke Signals

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Abstract

Native American Telecommunication Independence: One Step Above Smoke Signals

The digital divide disproportionately impacts Native American and Alaska Natives. Their homeland geographies, economies and technology footprints effect their ability to self-determine their Information Communication Technologies (ICT). The unequal access to information has rendered them Information Poor (Childers, 1975) and Technology Poor. Information and technology poverty have negatively affected the participation of Native American and Alaska Natives in the Information Age. Tribal leaders from the Pacific Northwest are challenged with bridging this digital divide with limited technologists, non-tribal capital investments and disregard for their tribal sovereignty.

Through a series of interviews and examination of documents, this dissertation investigated (1) how the Puyallup Tribe of Indians and Tulalip Tribal Council members decide to implement ICT on their sovereign lands; and (2) the impact of those decisions on their community members.

These two tribes are at two opposite points in ICT development. This examination of tribal decision-making concerning ICT identified six recurring themes: sovereignty, economics, geography, information poverty, the Federal Communications Commission and a Tribal Broadband Fund. The study found that honoring the tribes' sovereignty, in all matters related to ICT, is the most effective means for bridging the digital divide. The co-creator model is posited as a first step in establishing the proper working relationship between the tribes and the federal government, thereby addressing the root of the digital divide in Indian Country.

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DEDICATION

I dedicate this dissertation:

To my family, whose love, courage and indomitable spirit taught me humility and service to human kind; to my spouse, who withstood the changes in me and believed that a dissertation was possible; and to Washington NASA Space Grant Consortium that challenged and believed in me.

CHAPTER 1. INTRODUCTION

The Information Age¹ has produced information-based economies that require Information Communication Technology (ICT) digital connectivity for production and competition. Fast data transmission and ability to connect globally changed the way people communicate and share information. Information is essential for survival and prosperity. However, not all segments of society have equal access to the realities of the Information Age. As early as 1975, Childers referred to these groups as the information poor in America (Childers, 1975). The disparity between the information rich and the information poor is currently designated as the digital divide.²

Unequal access to ICT telecom signals inhibit societies from participating in the Information Age. Inadequate digital signal access, for example, significantly limits access to Emergency Communication Networks (ECN), online education, telehealth and voter registration. American Indians and Alaska Natives³ (AIAN) are disproportionately impacted by the digital divide and are consequently information poor (Norris, 2001, p. 4). The United States systematically displaced them from their traditional homelands through legal policies that disrupted or denied their sovereign right to self-determine life on their lands, waters, aerosphere and airspace.⁴

¹Information Age generally defines a transition to an economy based on information (Castells, 2011). The Information Age shifted industrial revolution industries to an economy based on information. The advancement of communication technologies created a digital society that divided the generations prior to 1969.

² Digital divide refers to the information disparity between people with access to digital connectivity with those that do not. For this research, I underscore the social digital divide that identifies the gap between the information rich and the information poor (Norris, 2001).

³ For this research, American Indians and Alaska Natives AIAN refers to communities who signed treaties with the US. Retrieved from <http://www.ncai.org/about-ncai> on February 22, 2015.

⁴ For this research, lands, waters and aerosphere refer to the nature of the continent of America. This includes all topographic and water features, inclusive of land and oceans. The aerosphere is the entire atmosphere that surrounds earth. The aerosphere contains the airspace that airwaves travel through and therefore the terms are used interchangeably. Retrieved from Merriam-Webster <http://www.wordcentral.com/cgi-bin/student?aerospace> on June 2014.

The United States governs all aerospace, within its internationally recognized boundaries, through the Federal Communications Commission (FCC) whose mandate is to assure digital connectivity for the entire country. The FCC's control of the aerospace restricts AIAN Tribes' ICT endeavors, specifically Cellular Telecommunications (telecom), because the FCC is tasked with ensuring tribal members and societies have equitable digital signal access. Hence, the FCC has a fiduciary responsibility to assure that AIAN Tribes have appropriate access to ICT opportunities and infrastructure. Tribal leaders across the country are faced with the conundrum of making decisions on the inception, deployment and propagation of ICT and telecom with limited information and insufficient access to experts. Research on tribal leaders' ICT and telecom decision-making process is negligible. Therefore, the purpose of my research is to investigate ICT decision-making in the Puyallup Tribe of Indians (Puyallup) and Tulalip Tribes (Tulalip). They are both Coast Salish Tribes of Washington State with distinct similarities and differences.

The Puyallup and Tulalip Tribes are geographically situated in the Pacific Northwest and parallel to Interstate 5. Both tribes have successful casino and chance gaming ventures and provide revenue per capita⁵ funds to their members. They are at two different ICT and telecom saturation points. For example, Tulalip Tribes have incepted Salish Networks to provide technical service for their members. Moreover, they offer digital connectivity to their surrounding communities that include the City of Marysville, Washington (Figure 1). In contrast,

⁵ Per-capita payments are made to American Indians and Alaska Natives by the US Government to use reservation lands for project and/or mineral leases, etc. These payments are based on the fact that the US holds reservation lands in trust. Retrieved from <http://www.narf.org/frequently-asked-questions/> on June 4, 2015. Moreover, tribes decide whether they distribute per-capita payments to their members.

Puyallup Tribe of Indians entered cellular and digital signal access agreements with telecom Large Capacity Carriers (LCC), such as Verizon and Comcast.

The tribal councils of both communities are tasked with decision-making for ICT and telecom design, inception, deployment and propagation within their sovereign lands.⁶ In addition, Puyallup and Tulalip Councils contain an equivalent number of elected positions at seven, yet the tribes differ in the duties assigned to each council member. Their leaders have the monumental task of coordinating their digital connectivity needs with federal government agencies. The legal nature of ICT endeavors requires relationship building with advocates from private industry and non-government organizations that should ensure tribal leaders receive appropriate information relevant for their decision-making process. With little access to trained ICT and telecom professionals and engineers, tribal leadership lacks the baseline information required to formulate the proper questions. To that end, my research questions are as follows:

⁶ Sovereignty is the supreme, absolute, and uncontrollable power by which any independent state is governed; supreme political authority; the supreme will; paramount control of the constitution and frame of government and its administration; the self-sufficient source of political power, from which all specific political powers are derived; the international independence of a state, combined with the right and power of regulating its internal affairs without foreign dictation; also a political society, or state, which is sovereign and independent. The power to do everything in a state without accountability, to make laws, to execute and to apply them, to impose and collect taxes and levy contributions, to make war or peace, to form treaties of alliance or of commerce with foreign nations, and the like.

Sovereignty in government is that public authority which directs or orders what is to be done by each member associated in relation to the end of the association. It is the supreme power by which any citizen is governed and is the person or body of persons in the state to whom there is politically no superior. The necessary existence of the state and that right and power which necessarily follow is "sovereignty." By "sovereignty" in its largest sense is meant supreme, absolute, uncontrollable power, the absolute right to govern. The word which by itself comes nearest to being the definition of "sovereignty" is will or volition as applied to political affairs (Black's Law Dictionary, Sixth Edition).

1: How do tribal council members decide to implement ICT and telecom in Indian Country?

1.1 What were the considerations tribal council members reflected on prior to implementation?

2: What are the impacts of those decisions on their tribal membership?

2.1 What do tribal members think about their telecom access?

1.1 Context for the Study

Coast Salish^{7,8} Peoples (Salish) of the Pacific Northwest (PNW) have endured systematic displacement, loss of identity and self-sufficiency as a consequence of European colonization. Colonial displacement shattered their identity and severed their relationship with ancestral lands, waters and the atmosphere. In addition, the Salishan languages have deteriorated or been extinguished through forced assimilation at government boarding schools and separation of children from their families. This loss of identity is further exacerbated by the fact that Salish People were forced to sign treaties with the US. This is evident in The Hellgate Treaty of 1855 where Salish Head Chief Victor refused to sign the treaty and stated, “I sit quiet and before me you give my land away.” Assembled Chiefs signed the Hellgate Treaty in 1855 even though they were “unfamiliar with American concepts of land ownership and both the treaty and the discussions regarding land ownership were poorly translated.”⁹

⁷ Vine Deloria provides a Salish map of traditional lands of Western Washington prior to its colonization; see Figure 2. Deloria (2012). Indians of the Pacific Northwest.

⁸ Pacific Northwest Tribes are identified by their Salish and Coast Salish Languages. Geography separates Coast Salish Peoples and Salish Peoples. Therefore, Coast Salish Peoples share coastlines with the Pacific Ocean and Salish Peoples are generally referred to as Plateau Indians, because they live in semi-arid lands east of the Cascade Mountains. Retrieved from, <http://www.britannica.com/topic/Salish> on June 8, 2014.

⁹ The 1855 Hell Gate Treaty. Posted on March 31, 2011 by Ojibwa at <http://nativeamericannetroots.net/diary/tag/Treaties>

These treaties permitted the US to impose penalties on any AIAN person or community that violated these “new” land, water or atmosphere boundaries. These boundaries were in direct contradiction to Salish traditions that allowed the sharing of all seaway waters, land and the atmosphere. Prior to these treaties, the Salish Peoples approached boundaries as dynamic and malleable to ensure the livelihood of all beings within the continent.¹⁰ These rigid boundaries continue to be unintelligible to Salish Peoples who cared for the American continent prior to its colonization and renaming by Europeans. Geographic boundaries have disturbed and eliminated Salish Peoples’ access to ancestral foods, fishing, hunting, medicines, and ceremony geolocations.¹¹ For Salish Peoples, the sharing of Mother Earth does not include white picket fences, land surveyors to determine boundaries or limits legal rights to the waters, land or the atmosphere. European colonizers ignored the Salish Peoples’ preexisting sophisticated and complex laws that determined the nature and amount of sharing allowed per tribe.

Coast Salish Peoples believe in a relational¹² approach to life. They focus on connecting or relating to their environment rather than competing with it. This way of life established a sharing principle that assured their prosperity. For example, today, the Salish Peoples continue to

¹⁰ Lushootseed people organized themselves into autonomous towns, in contrast to the large tribes elsewhere. Far from isolated, these towns were linked through trade and marriage to other communities in Lushootseed territory and beyond. While conflict sometimes erupted between towns, intimate connections ensured a sharing of resources between neighboring communities. One of the most important traditions for maintaining these connections was the Sgwigwi, a word that simply means "inviting," and corresponds to the more familiar term potlatch, in which wealthy people displayed their social status by sharing their wealth with others Coll-Peter Thrush Essay, n.d. Retrieved from <http://content.lib.washington.edu/aipnw/thrush.html#bibliography> on April 4, 2015.

¹¹ Geolocation identifies a location through digital information processed in the internet. Oxford Dictionary, retrieved from <https://en.oxforddictionaries.com/definition/geolocation> on June 8, 2015.

¹² Relationality as defined by Shawn Wilson, in his 2001 book titled *Research is Ceremony: Indigenous Research Methods*, page. 177, “An Indigenous paradigm comes from the fundamental belief that knowledge is relational. Knowledge is shared with all creation. It is not just interpersonal relationships, or just with the research subjects I may be working with, but it is a relationship with all of creation. It is with the cosmos; it is with the animals, with the plants, with the earth that we share this knowledge. It goes beyond the idea of individual knowledge to the concept of relational knowledge . . . [hence] you are answerable to all your relations when you are doing research.

conduct canoe journeys to rekindle the spirit of their ancestors' travels throughout the Pacific Rim to trade goods. They continue to fish and hunt elk and buffalo, animals who sacrifice their lives so that the Salish Peoples' may live. The Salish Peoples honor birds by wearing their feathers and mirroring their movements at spiritual and cultural ceremonies.¹³

It is important to note that Coast Salish Peoples are not a homogenous group with one way of knowing and set of practices. However, there are some commonalities such as Salish Peoples fundamentally accept that each community has the right to pursue the wellbeing of its tribal members. Individual Salish Tribes protect their fishing, hunting and edible plant locations by warning non-members to ask permission prior to harvesting. Historically, Salish Tribes discovered that the most effective way of signaling non-tribal members was through fires. Many books and stories describe "smoke signals" as the way AIAN and Salish Peoples sent long distance messages, or in contemporary terms, telecommunicated, through pre-established semiotics and symbolism.¹⁴ Today, tribal leaders of the Salish Peoples of the Pacific Northwest seek effective communication technologies for long distance communication. The Information Age has transformed symbology, such as totem poles, to a digital series of 0s and 1s.

Cartography and Geographic Information Systems (GIS) produce information graphics for policy makers and decision makers. The United States identifies cartography and GIS as objective and fair apparatuses for producing critical information for decision-making: "ArcGIS is

¹³ Spirit powers were most evident during the ceremonies held in December and January, when the spirits visited Lushootseed towns and assisted in the rituals that bound communities together. In the longhouses, individuals performed the Winter Dance, releasing their spirit powers through expressive movements and songs. Coll-Peter Thrush Essay, n.d. Retrieved from <http://content.lib.washington.edu/aipnw/thrush.html#bibliography> on January 8, 2015.

¹⁴ Semiotics and symbolism may be recognized, for example, through Totem Poles. Retrieved from <http://indigenousfoundations.arts.ubc.ca/> on August 4, 2015.

your first step toward better, smarter decision-making and a more efficient organization. Just about every problem and situation has a location aspect. Unlock the power of location with ArcGIS (esri ArcGIS, 2016).”¹⁵

The integration of digital systems and software for decision-making requires that tribal leadership have the knowledge or access to experts to effectively make decisions that benefit their members. As previously stated, societies that do not have equal access to knowledge of those systems and software are information poor and negatively impacted by the digital divide. The lack of ICT technology infrastructure also identifies the tribes as technology poor. Salish decision-makers are systematically at risk of creating policies based on outdated information systems that may put them at the mercy of profit-making companies.

1.2 Information, Technology and Legislation

On July 29, 2010, the Federal Communications Commission (FCC) established Order 10-141: “To promote the deployment and adoption of communication services and technologies within Native communities and on Tribal lands, the Commission has concluded that the proper dispatch of its business and the public interest will be served by reorganizing the Consumer and Governmental Affairs Bureau (Bureau or CGB) to create an Office of Native Affairs and Policy.”¹⁶ The Office of Native Affairs and Policy is responsible, “for bringing the benefits of a modern communications infrastructure to all Native communities,”¹⁷ by recommending solutions to digital connectivity issues and technology considerations.

¹⁵ ArcGIS Platform, retrieved from <http://www.esri.com/software/arcgis> on April 6, 2015.

¹⁶ FCC 10-141, retrieved from https://apps.fcc.gov/edocs_public/attachmatch/FCC-10-141A1.pdf on April 7, 2015.

¹⁷ Federal Communications Commission’s ONAP, retrieved from https://apps.fcc.gov/edocs_public/attachmatch/FCC-10-141A1.pdf on June 8, 2015.

It is of critical importance to note that geographic location plays a significant role in exacerbating the digital divide in Indian Country. Telecommunication Large Capacity Carriers (LCC) Cost-Benefit Analysis (CBA) calculations have determined a higher Return on Investment (ROI) from non-AIAN areas such as urban, metropolitan locations and densely populated places. However, the Communications Act of 1934 stipulated that LCCs are required to provide all US Peoples with access to rapid and efficient nationwide communications services and adequate facilities at reasonable charges.¹⁸ To do so, LCCs are required to support and finance the Universal Service Fund (USF) in order “to promote universal access to telecommunications services in the United States (FCC USF, 1996).”¹⁹

The Telecommunications Act of 1996 expanded the traditional definition of universal service and affordable nationwide telephone services to include rural health care providers and eligible schools and libraries. As of 2016, the FCC provides universal service support through four mechanisms:

High Cost Support Mechanism (HCM) that distributes support for qualifying telephone companies that provide service to high cost geographic areas while ensuring customer affordability;

Low Income Support Mechanism (LISM) assists low-income customers by covering the initial connection cost and monthly charges;

¹⁸ 1934 Communications Act, retrieved from <https://transition.fcc.gov/Reports/1934new.pdf> on January 4, 2016.

¹⁹ Universal Service Fund, retrieved from <https://www.fcc.gov/general/universal-service> on January 4, 2016.

Rural Health Care Support Mechanism (RHCSM) reduces the cost for rural telehealth providers to ensure similar connectivity to their urban counter partners;

Schools and Libraries Support Mechanism (SLSM), provides local and long distance high-speed line telecommunication services, internet access, and internal hardware connection for eligible schools and libraries; also known as E-Rate.²⁰

Given the relevance of each of the four mechanisms to the realities of Indian Country (geographic location, low income, rural environments plus education challenges) the 1996 Telecommunications Act should have had a positive impact, if not constituted the solution. However, this has been the case in only some communities.

1.3 Background on ICT

The atmosphere contains airspace and airwaves that fall within jurisdiction of countries that signed accords.²¹ It is the premium commodity necessary for profit making in the cellular telecom market. Cellular telecom companies compete for control of the airspace because it provides a canvas for the development of new telecom products necessary for increasing user subscription rates. These companies continually change as a consequence of business mergers and acquisitions by global telecom industry leaders. The resulting telecom conglomerates have a significant effect on pre-established relationships and agreements with tribes. The impact is

²⁰ FCC four mechanisms of support, retrieved from <https://www.fcc.gov/general/universal-service> on August 5, 2016.

²¹ Airspace refers to the space that is above a country and that is legally controlled by that country. Retrieved from Merriam-Webster Dictionary <http://www.merriam-webster.com/dictionary/airspace> on April 8, 2015.

partly due to telecom conglomerate airspace monopolies that modify signal access and subscription costs. Often, tentative telecom agreements with tribes are modified or completely abandoned. For example, Alltel Wireless²² provided critical digital signal to Montana and Wyoming geolocations that included the Crow Nation and Blackfeet Nation (Figure 3). In 2013, AT&T bought Alltel Wireless and summarily transferred Alltel Wireless subscribers to AT&T services. AT&T benefitted from the expanded geographic presence and acquisition of subscribers who had no other telecom service provider choice. Subscribers were then bound to cost increases and signal service degradation as a result of the 2013 merger (Figure 4).

Digital literacy is a key component for successfully integrating existing and new subscribers. The information poor, in this case the Crow and Blackfeet Nations, are expected or assumed to understand company specific and esoteric nomenclature and troubleshooting techniques. They are also expected to self-diagnose their end-user device signal issues and cellular access costs or use taxonomic flowcharts and precise terms when speaking with customer service. Troubleshooting includes the discovery of signal access through hardware devices. Those who fail to achieve a cellular connection generally use alternate means to contact their service providers, such as Wi-Fi broadband signal. Thus, subscription rates fluctuate based on end-users' perception of better service providers for their geographic location.

²² AT&T VP of Federal Regulatory Joan Marsh comments after acquisition of Alltel, "these low cost services will be discontinued...The extraordinary delay in approving [FCC petition to transfer eligible telecommunications carrier designation from Alltel] imperils the availability of the very wireless services that the Commission seeks to encourage and support through the Native Nations items." Retrieved from <https://www.benton.org/node/51947> on June 4, 2016.

Affordability of cellular service also alters subscription rates. Large Capacity Carriers (LCC) entice subscribers with no-cost change policies from their original LCC provider. This marketing ploy typically negatively impacts subscribers who have minimal telecom literacy, or inadequate understanding of complex and esoteric LCC contracts and customer agreements.

1.4 Telecommunication and Information Poverty

The Information Age rapidly changes the way that we interact with each other as Information Communication Technologies (ICT) and telecommunications (telecom) provide platforms for fast and long distance communication that leaves behind late adopting societies.²³ In the field of information science, this phenomenon is known as the digital divide. Scholars theorize on various approaches to mitigating the digital divide. Digital inclusion is generally referred to as a solution for bridging the distance between early and late ICT and telecom adopters. Adoption of technology is associated with the information access. To that end, this study is informed by Thomas Childers' characterization of the Information Poor in America (Childers, 1975).²⁴

1.5 Innovation and Telecommunications

Information Communication Technologies (ICT) and telecommunications fast paced innovation introduces and increases digital signal spectrum, speeds of transmission and hardware capabilities. Innovation in turn, produces a societal desire for such technologies. For example,

²³Gregory Wozniak states, "adopters find information more useful in the early stages of the adoption decision process than in the later stages. Also, technical knowledge about new inputs accumulated from different information sources is complementary." Wozniak, G. (1993). Joint Information Acquisition and New Technology Adoption: Late Versus Early Adoption. *The Review of Economics and Statistics*, 75(3), 438-445.

²⁴ Childers, Thomas, & Post, Joyce A. (1975). *The Information-Poor in America*. Scarecrow Press, P.O. Box 656, Metuchen, New Jersey 08840.

end-user devices are now small mobile computers capable of online work production, online education and telehealth. Cellular signal telecom companies compete to meet society's desire for new telecom services by quickly introducing technology products to the market in order to gain an economic advantage through end-user cellular signal subscription rates.

The impact of the Information Age on the tribes illustrates a gap in our society. My study investigated the way in which the leadership of two Coast Salish Tribes addressed this challenge in the design and implementation of ICT to serve their communities.

Chapter 2 Literature Review

American Indian and Alaska Native (AIAN) decision-making concerning Information Communication Technologies (ICT) and telecom design, deployment and propagation on their sovereign lands is not well researched nor documented. My dissertation focused on understanding the information tribal leaders need to make decisions regarding ICT and telecom and the impact of those decisions on their tribal members. A study of all 566 federally recognized tribes was not feasible due to the complexity of AIAN leadership structures, geographic diaspora, and individual treaty agreements. To scale this study, two Pacific Northwest Tribes or Puyallup Tribe of Indians (Puyallup) and Tulalip Tribes (Tulalip), were selected as case studies. They are both located within Washington State's Puget Sound area and identify as Coast Salish due to their proximity to the Pacific Ocean and common Salishian language usage.

To understand Puyallup and Tulalip Tribal Councils' information needs for decision-making concerning ICT, my research project concentrated on the following research questions:

- 1: How do tribal council members decide to implement ICT and telecom in Indian Country?
 - 1.1 What were the considerations tribal council members reflected on prior to implementation?
- 2: What are the impacts of those decisions on their tribal membership?
 - 2.1 What do tribal members think about their telecom access?

While the published research on ICT and telecom on AIAN lands is sparse, this chapter is divided into six areas and provides an analysis of relevant literature and essential documents:

1. Treaties
2. Legislation
3. Diffusion of Telephony
4. Telecommunications Today
5. Stages of Stakeholders
6. Pacific Northwest

While economics has a role in tribal councils' decision-making, it is minimally referenced in this study, as the relevant literature tends to focus on overall economic poverty rather than the broader challenges of leadership and decision-making. However, the study of economics identifies how Puyallup and Tulalip Tribes invest in ICT, but that is not the focus of my study. A broad review of the two tribes' economic policies was conducted to understand the economics language used by the tribes when making decisions on ICT. Some economic base studies²⁵ and telecommunications conversion rates²⁶ were consulted for clarification.

²⁵ Economic base studies are predictors on the effects of new economic activity on cities and regions. <http://www.rri.wvu.edu/WebBook/Schaffer/Chapter%203%20S11%20for%20WVA2.pdf> retrieved on August 10, 2015.

²⁶ Telecommunication conversation rate refers to the number of people that take a specific desired action. For example, the ratio of people that had an opportunity to subscribe to a telecom provider and those who actually did (converted). Retrieved from <http://www.inc.com/jeff-haden/website-analytics-conversion-rate-vs-take-rate.html> on April 4, 2015.

2.1 Treaties

A discussion of the language and intent of treaties, which are grounded in concerns of land and resources, is fundamental to all issues of decision-making and includes those concerning ICT. American Indian and Alaska Natives govern their lands that are referred to by various designations and include: reservations, nations, bands, pueblos, and native villages. While many pieces of legislation have sought to enable tribes to realize and actualize their decision-making authority on their lands, this review will discuss those which most impact tribal decision-making in areas related to ICT.

Treaties became known as “contracts among nations” and included provisions for exclusive rights, benefits and conditions for the tribes that agreed to cede millions of homeland acres to the US in exchange for its protection (BIA FAQs, 2016). Treaties became the law of the land from 1778 to 1871 and are the legal basis for the recognition of tribal sovereignty. Treaties established legal definitions of AIAN lands which included access to ancestral resources and representation. However, AIAN populations were not properly designated in the first US Census Report of 1790. The 1860 US Census report was the first to identify AIAN as unique populations. In other words, 70 years passed before AIAN were recognized as sovereign and independent (Handbook, 2011, p.1).

2.2 Legislation

American Indian and Alaska Natives’ (AIAN) sovereignty and nation-to-nation relationship with the US is the result of treaty agreements. The 1975 Indian Self-Determination and Education Assistance Act promotes and advocates “maximum Indian participation in the

programs and services conducted by the Federal Government for Indians (Public Law 93-638, 1975).” Public Law 93-638 provides umbrella legislation that authorizes AIAN, for example, to undertake and design ICT and telecom on their lands.

Land designations are important for understanding why there are differences in ICT and telecom access on federal and non-federally recognized lands. American Indians and Alaska Natives that are federally recognized have the sovereign right to that land and the legal right to self-determine within their boundaries. Theoretically, this should facilitate decision-making concerning ICT and telecom on tribal lands and airspace.

As of 2012, there are 566 federally recognized tribes and approximately 56.2 million acres of land held in trust by the US (Public Law 93-638). Federal Indian trust is “a legally enforceable fiduciary obligation on the part of the United States to protect tribal treaty rights, lands, assets, and resources, as well as a duty to carry out the mandates of federal law with respect to American Indian and Alaska Native tribes and villages ([BIA FAQ](#), 2016).”

United States trust designated lands are held for a variety of AIAN tribes and individuals. The trust administers 326 AIAN occupied pueblos, rancherias, missions, villages or communities. Additionally, there are numerous smaller reservations with approximately 1,000 acres of land. The largest land held in US trust is the 16 million acre Navajo Nation Reservation located in the states of Arizona, New Mexico, and Utah. The smallest US land trust is the California Pit River Tribe’s cemetery parcel at 1.32 acres ([Federal Register](#), 2012).

American Indian and Alaska Native lands are designated as either, allotted lands, restricted status or state Indian reservations. Allotted lands are remnants of reservations that were partitioned during the federal allotment period of the late nineteenth and early twentieth centuries ([Dawes Act, 1887](#)). The 1887 Dawes Act provided legal policy for the distribution of land until the Indian Reorganization Act of 1934. The Dawes Act is generally referred to as the General Allotment Act, because the allotted lands were defined and conveyed to tribal members affected by this policy. The federal government held allotted land in trust and these lands were untaxed; however, once the lands were taken out of trust, they became subject to state and local taxation. Land sold by an AIAN to a non-AIAN immediately rendered that land as taxable and lost its US trust designation.

Lands with “restricted” status may be individually owned by AIAN tribal members or the tribe may hold the land title. The land title may only be divided or encumbered by the owner with the approval of the Secretary of the Interior. This is possible through a federal law conveyance instrument.²⁷ American Indians and Alaska Natives lost thousands of acres due to confusing western definitions of “selling land.”

American Indian and Alaska Natives (AIAN) were not schooled in the legal and English language nuances that identified the consequences of “selling their lands.” American Indians and Alaska Natives have a protective relationship with their land that transcends the western concept of ownership. Land, in unison with the atmosphere, animals, plants and beings are to be protected respected and shared. The loss of land was enormous and today, there are only approximately

²⁷ Tribal Land Environmental Information Clearinghouse. Environmental resources for tribal energy development. Retrieved from <https://teeic.indianaffairs.gov/triballand/> on May 4, 2015.

10,059,290.74 million acres of individually AIAN owned lands held in trust by the United States (Champagne, 2013).

State Indian reservations, as opposed to federal reservations, are the result of land agreements between AIAN and US. In this case, the individual state holds specified lands in trust. Consequently, those residing on state reservation lands are not required to pay state property tax, but are subject to state laws. Washington state does not have state-recognized tribes. However, seven landless non federally recognized tribes are included in the state's tribal directory. This is partly due to the seven tribes' litigation concerning federal recognition. In my study, I argue that federally recognized tribes are nations that have rights to self-determine their ICT and telecom endeavors.

The purpose of discussing the legislation documents related to legal and historic land agreements, is to introduce the standing complexity that underlies AIAN Tribes' ICT decision-making considerations. Land designations and federal or state recognition determine the tribal councils' authorization and latitude toward decision-making on ICT for their communities. Federally recognized tribes operate with a right to self-determine within their sovereign lands. Their sovereign status provides legal arguments to lead, design and implement ICT digital signal systems. For example, I argue that tribal ICT endeavors rights within their lands is supported by the Boldt decision that reiterated Salish Tribes' rights to co-ownership of Pacific Ocean and waterways seafood (Boldt, 1975). Tribal land ownership and co-ownership of ocean should also include ownership of their airspace and airwaves.

2.3 Diffusion of Technologies

As early as the 1900s, the importance of communication technologies began to evolve in the United States. While there is no evidence to indicate any participation of the tribes in the initiation, the consequences of these technologies would inevitably impact the tribes.

Information Communication Technologies (ICT) and telecommunications have been an integral part of a healthy society and economic development (NAP, 2016, p. 4). In the 1900s, telephones were designated as technology tools necessary for economic commerce and were considered symbols of wealth. The introduction of telephones in the US immediately divided individuals who could afford them from those that could not. Telephone purveyor Alexander Graham Bell established a telephone monopoly by attaining legal patents for his telephones and by creating user-subscriber and pay-as-you-use business models. To achieve telecom dominance, he leased telephones to paying subscribers and charged varying fees for wireline²⁸ access. In 1893, key patents expired and opened the market for competition. The result was increased access to telephones and wireline through new vendors (Gershon, 2009). The expiration of key patents created a fierce competition for telecom subscribers, which in turn, proliferated telephony in the US and around the world. Society's demand for telephones and telecommunications resulted in 41% of American households owning at least one telephone by 1930. By the 1960's telephone saturation had achieved critical mass in the US (Visualizing Econ, 2008).

²⁸ Wireline refers to the traditional telephone poles with cables that give access to voice transmission signal per subscribing home. Retrieved from Merriam-Webster Dictionary http://www.merriam-webster.com/dictionary/wireline?utm_campaign=sd&utm_medium=serp&utm_source=jsonld on October 4, 2015.

2.4 Telecommunications Today

On September of 2010, the Federal Communications Commission (FCC) released the report *Trends in Telephone Service* for public record. The report was designed to answer telephone industry frequently asked questions, by individuals, congressional and government agency members, business, academia and telecommunications carriers. The report provides summative information of size, growth, and development of the telephone industry. It also includes market share data, minutes of calling, number of lines, and telephone subscribership. This report further provides information about “access charges, advanced telecommunications, consumer expenditures for service, infrastructure, international telephone traffic, local telephone competition, telephone rates and price changes, toll service providers, and universal service support (Trends, 2010, p. 1-1).” The trend lines are reported under the heading “broadband”²⁹ and includes rural and urban telephone service trends. However, the report does not provide trend data for American Indian and Alaska Native telephony.

In 2010 the FCC created the Office of Native Affairs and Policy (ONAP) to provide a vehicle for reporting telecom and other ICT trend data. However, there is no evidence that those trends are reported. Moreover, there is minimal literature on the data elements necessary for American Indian and Alaska Natives’ ICT decision-making. This is problematic, because there is a lack of sufficient background information and access to raw data on ICT with which to correlate my findings.

²⁹ Broadband refers to high-speed digital data transmission technologies, typically used for access to the internet. Retrieved from http://www.broadband.gov/broadband_types.html on January 4, 2015.

2.5 Stages and Stakeholders

American Indian and Alaska Native sovereign status represents a challenge for Information Communication Technologies Scholars, telecom businesses and federal agencies. The FCC's inception of ONAP was a first step toward developing a dialogue with tribes; however, ONAP is still developing and growing and it appears that there is miscommunication, "FCC-ONAP in 2010 to carry out its consultation efforts and develop a tribal agenda to improve telecommunications regulatory deployment in Indian Country, there seems to be little influence from the Administration to ensure tribal issues are included (NCAI, Tribal Leader Briefing Book, 2015, p. 39)."

The challenge for the federal government and the FCC is to gain the trust of tribes through systematic and consistent interaction. For example, the FCC sought comments on radio service for tribal communities on April 2009. Yet tribes had already identified the critical telecom need for economic competitiveness through the *Telecommunications Technology and Native Americans: Opportunities and Challenges* report in 1995 (Opportunities and Challenges, 1995). That seminal report was funded by the US Congress Office of Technology and provided a tribal perspective on ICT and telecom infrastructure models plausible for Indian Country. Moreover, the ICT questions posed in that report are still relevant today.

The 1995 Opportunities and Challenges report conveyed AIAN attitudes on the importance of telecom technologies and their desire to be connected through digital platforms. American Indians and Alaska Natives from several tribes provided their ICT insights and specifically stated the solution toward inclusivity was through, "Native owned and operated

business and especially telecommunications businesses.” The report also argued that telecom technology presents Indian Country with opportunities for jobs that would stimulate their overall economies (Opportunities and Challenges, 1995, p.62). The economic impacts of AIAN telecom ownership strategically opens opportunities for telecom subscription competition and challenges current Large Capacity Carrier (LCC) telecom companies that monopolize Indian Country airwaves. However, the lack of federal investment on AIAN ICT and telecom has motivated AIAN to develop their own telecom infrastructure. Their efforts have resulted in new AIAN owned telecom companies that serve as the primary telecom digital signal providers for their reservation members. For example, an entirely AIAN owned and operated telecom service provider is the Cheyenne River Sioux Tribe Telephone Authority. It was established in 1958 (CRST, 2016) with initial estimated assets of \$100,000. As of 2015, their company's assets exceed 10 million dollars.

The Office of Technology Assessment was collapsed in September 21, 1995 or approximately one month after the report was made public. Subsequently, in July of 1995, the US Department of Commerce’s National Telecommunications and Information Administration (NTIA) provided a report entitled *Falling Through the Net: A Survey of the ‘Have Nots’ in Rural and Urban America* (NTIA, 1995). The report provided evidence of AIAN having the least amount of telephone lines in comparison to other ethnic groups. Table 4 of that report shows AIAN, who live in rural areas, have the lowest telephone saturation level at 75.5% compared to 95.4% of white non-Hispanics (NTIA, 1995, Table 4).³⁰

³⁰ For my thesis Table 1 represents NTIA Table 4. The original table may be viewed at the following URL <https://www.ntia.doc.gov/legacy/ntiahome/TABLES.htm#Table4>

The disparity of telephone penetration in Indian Country motivated US Senator Max Baucus (Montana) to introduce Bill S.761 - Native American Telecommunications Improvement and Value Enhancement Act (TIVE) in April 2001. The bill was designed to equalize the level of telephone access in Indian Country with that of other communities. The bill's intent was to achieve 90% telecom penetration in Indian Country through economic investment.

During the timeframe of the bill, telecom penetration for, "Native Americans on reservations was 47 percent, with some reservations as low as 16 percent, as compared to 94 percent for the entire United States (107th Congress 1st Session - S. 761, 2001, p.1)." The bill also stated that, "barriers to telephone penetration on Native American reservations included poverty (the per capita income for Native Americans at the time was \$8,234) and the high cost of service due to sparse population and geographic challenges (107th Congress 1st Session - S. 761, 2001, p.2)."

The per capita identified in the TIVE Bill was calculated by taking the total population size of a community and dividing it by the total income of that community. Hence in 2001, TIVE reported AIAN per capita at \$8,234. On the other hand, White populations' per capita was reported to be \$24,127 in 2001 by the US Census Bureau, Consumer Income ([Money Income US, 2001](#), p.4). Based on those numbers, the 2001 per capita of AIAN represented only 34% of Whites. Politically, TIVE was sponsored by democratic senators who represented the states of, Montana, South Dakota (2 senators), Hawaii, Minnesota, New Mexico and Washington. However, the last action taken on TIVE was on April 24, 2001 when it was introduced to the Senate.

The FCC presented a Notice of Proposed Rulemaking (NPRM) in On March 3, 2011 regarding the matter of *Improving Communications Services for Native Nations by Promoting Greater Utilization of Spectrum over Tribal Lands*. A NPRM is created when a US agency works to update, add and remove a rule or regulation as part of the process of rulemaking. The NPRM process is part of the US administrative law that provides a forum for public comment in order to achieve support for government action (OFR, n.d).

The 2011 NPRM stated that the national rate of wireline combined with wireless telephone subscribership at that time was 97.6%. American Indians and Alaska Native members living on reservations had a 67.9% subscription rate. The 67.9% is statistically standardized so the range of telephone subscription is more evident when individual tribal data is separated. For example, the Navajo Reservation Members had a subscription rate of approximately 37.4% during that timeframe. Additionally, estimations show that 95% of the US population has access to the terrestrial fixed broadband infrastructure technology that enables wireless broadband service. Yet, AIAN tribal members living on reservations were reported to have less than 10% access to terrestrial fixed broadband ([FCC 11-29, 2011, p.2625](#)).

Tribal councils are presented with a complex situation as their ICT and telecom needs are tied to controlling political systems that own bandwidth. Tribal councils are also limited in increasing ICT access as a consequence of their geography and contractual agreements with Large Capacity Carriers. This is exacerbated by the fact that private telecom providers, such as AT&T and Verizon, are not required to provide digital connectivity services to tribes. Moreover, tribes are obligated to present profitable business cases to LCC's or otherwise risk not having

cellular and digital services. To add to the complexity, many tribes (Duarte, 2013, p.66) have insufficient ICT knowledge that is compounded by ICT private industry's difficulty navigating tribal business models. Hence, the tribes often rely on advocates, like the federal government, to bridge their digital divide.

2.6 Pacific Northwest

Tribal council ICT and telecom advocates have been documenting the digital landscape. Unfortunately, there is a limited number of information professionals and scholars who could use this documentation to produce solid research and publications. Recently, in an effort to address this void, Pacific Northwest Tribes have joined together to discuss the need for technical experts, and researchers to generate academic literature through the Affiliated Tribes of Northwest Indians (ATNI) Energy Program (About ATNI Energy Program, n.d.).

Pacific Northwest Tribes are keenly aware of their ICT and telecom limited knowledge and the obstacle Large Capacity Carriers' airwave control presents. Tribal leaders and ATNI participants are also aware of the digital divide. These challenges were documented in a June 10, 2015 ATNI Memorandum by Makah and Tlingit Tribes' authors and sent to Mr. Larry Strickling, Administrator National Telecommunications and Information Administration (NTIA) and Ms. Lisa Mensah, Under Secretary for Rural Development United States Department of Agriculture. The memo outlines the fundamental issues AIAN believe prohibit ICT on their sovereign lands. The memo specified that the lack of technical assistance and low service by Large Capacity Carriers (LCC) such as AT&T, Comcast, etc. needs to be immediately addressed (ATNI Ways to Further, 2015). The memo provides evidence that Affiliated Tribes of Northwest

Indians ICT and telecom experts had previously and jointly defined the problem and corrective actions needed to ensure tribal lands have appropriate digital connectivity.

As clear from this literature review, American Indians and Alaska Natives complex decision-making processes have not been documented or minimally studied by scholars. My literature review of necessity has considered the role and importance of treaties and legislation regarding ICT as fundamental to the historical understanding of the ICT issues in Indian Country. In addition, reports concerning the federal and state governments and private telecom companies, the tribes and other stakeholders, were reviewed. Finally, legislation and reports specific to the Pacific Northwest were examined.

The rise of ICT and telecommunications today coupled with tribal sovereignty, evident in legislation, updates and memorandums, disclose the complexity behind tribal decision-making on ICT in tribal environments. There is indeed a paucity of mainstream published research in this area. It is my intent that this research project, in which I observed and studied the complex ICT decision-making protocols of two Washington state tribes, will add to the body of available literature.

Chapter 3 Methodology

The digital divide negatively impacts American Indian and Alaska Natives (AIAN). Federal Communications Commission (FCC) Chairman Tom Wheeler stated that, “we still have a digital divide in this country, with rural communities, and especially Native Americans disproportionately on the wrong side of that divide, getting bypassed by the Internet revolution (WC Docket No. 10-90).” A digital divide consequently renders AIAN Tribes as among the information and technology poor in America (Childers, 1975). Their access to Information Communication Technologies (ICT) and telecommunications (telecom) infrastructure is sporadic at best (Table 2) and is not well documented in the research literature and the FCC. This unequal access to ICT leaves them farther behind in the Information Age.³¹ There is very little published information regarding the role of tribal leadership in addressing these matters.

Tribal councils are the governing bodies on reservations with the responsibility for decision-making in all areas of welfare for their communities, including matters related to ICT and telecommunications. Very little is known about the decision-making process that tribal council members utilize in making decisions. In addition, there is also very little known about the impact of those decisions on their communities. This study seeks to address this problem by focusing on the following research questions:

³¹ Information Age is generally defined as a shift to an economy based on information (Castells, 2011). The argument is that the Information Age shifted industrial revolution industries to an economy based on information. The advancement communication technologies created a digital society that divided the generations prior to 1969.

1: How do tribal council members decide to implement ICT and telecom in Indian Country?

1.1 What were the considerations tribal council members reflected on prior to implementation?

2: What are the impacts of those decisions on their tribal membership?

2.1 What do tribal members think about their telecom access?

Qualitative research methods were used to answer these research questions. Open ended semi-structured interviews and observations were the key instruments for collecting qualitative data. Additionally, impromptu conversations with tribal members, not directly associated with this research, also provided relevant data for my study. This methodology facilitated research investigation that included the intersection between people, technology and information in order to understand tribal councils' information needs when making decisions on ICT. Indigenous Systems of Knowledge (ISK),³² as a philosophical construct, was key in analyzing tribal councils' decision-making on ICT design, deployment and propagation. Relationality,³³ was considered during the data analysis phase on the impact of ICT decision-making on dimensions of community life. The interview data were supplemented with a review of pertinent concepts from social economics and affordability, employment and geography to discover and define terms that identify ICT commonalities and differences between Puyallup and Tulalip Tribes.

³² Indigenous Systems of Knowledge see glossary.

³³ Relationality: "Identity for indigenous people is grounded in the relationships with the land, their ancestors who have returned to the land and with future generations who will come into being on the land. Rather than viewing ourselves as being in relationship with other people or things, we are the relationships that we hold and are part of" (Wilson, p. 80).

Data measurement tools in these comparative case-studies included, descriptive statistics, social science of economics,³⁴ and geography.

American Indians and Alaska Natives (AIAN) are not a homogenous group, but rather nations and tribes with sovereign lands that have their own governments and sovereign rights. Their ICT and telecom needs are therefore unique to their members and geographic locations. As such, two Washington state tribes, Puyallup Tribe of Indians and Tulalip Tribes, were selected as case studies.

Undertaking a full Indian Country ICT decision-making and landscape study requires a consortium level of scholars and partnership with the US Government to conduct a multiyear longitudinal study. Due to the expansive nature of an AIAN ICT landscape study, my research was scaled to two tribes. My dissertation endeavors to add to the decision-making literature by examining the Puyallup and Tulalip Tribes legislative processes. This study does not propose hypotheses. The research results are not generalizable to all tribes, but may have implications for the other 27 Pacific Northwest Tribes.

The initial research process included six visits per tribe to observe and collect anecdotal data on cellular signal strength, and access, using the T-Mobile Cellular Provider network and cellular enabled mobile phone. My field visits included measuring cellular tower signal

³⁴ Social science of economics studies individuals' interactions with social systems to answer key questions on production and exchange of goods. Retrieved from <http://www.digitaleconomist.org/economics.html> on May 7, 2015.

connectivity³⁵ throughout Puyallup Tribe of Indians and Tulalip Tribes' reservation lands, including the most rural areas. I also collected anecdotal signal strength data at Puyallup's industrial locations they share with the Port of Tacoma, WA. The Affiliated Tribes of Northwest Indians (ATNI)³⁶ Energy Program Committee leaders corroborated my cellular signal strength observations. They illuminated my observations and guided me to other tribal leaders working to bridge the digital divide.

The ATNI Energy Committee leaders expressed the need for US Government Agencies to understand that tribal sovereignty requires financial investment and technical support. They suggested that I investigate the Federal Communications Commission (FCC) public policy on AIAN ICT and telecom, since the FCC is responsible for assuring that Indian Country has digital connectivity throughout the United States.

I found that the Affiliated Tribes of Northwest Indians hold three annual meetings that include energy experts. The energy experts discuss ICT best practices to maximize their participation and to optimize policy efforts for bridging tribal digital divide. Their strategy provides a unified Pacific Northwest Tribes' voice for addressing the unique ICT needs based on their geographic locations, economic development plans and tribal councils' decisions.

³⁵A cellular tower, or transceiver, provides cellular and wireless communication signal reception within a cell area. Cellular networks are radio signal networks that cover pre-established geographic areas. Each cell area is serviced by one or more cell tower, or transceivers, in a fixed location. Retrieved from <https://www.techwalla.com/articles/what-is-the-purpose-of-a-cell-phone-tower> on June 4, 2016.

³⁶ Affiliate Tribes of Northwest Indians is a non-profit 501(c) 3 corporation under the laws of the State of Oregon. They direct policy for Pacific Northwest Tribes through committees. Participants include 57 northwest tribal governments from the states of Idaho, Oregon, Washington, Northern California, Southeast Alaska, and Western Montana. The ATNI Energy Committee represents member tribes during regional and national policy processes related to tribal energy, electrical utilities, and transmission issues. Furthermore, they are involved in "regional transmission planning processes, energy efficiency and conservation, renewable energy development, and technical assistance to tribes (ATNI, 2016)."

3.1 Study design phases

The research design included four phases:

1. Site visits to gather observation information of their geographic environments.
2. Interviews of Puyallup and Tulalip Council members and Tribal members.
3. Federal Government and tribal Information Communication Technology document analysis.
4. As part of the interview selection process, I participated at Affiliated Tribes of Northwest Indians Conferences, Pacific Northwest Tribal Leaders Congress and council members' tribal community presentations.

3.1.1 Site Visitation

The research design included establishing a trusting relationship with Puyallup and Tulalip Tribes that I will maintain beyond this dissertation work. My visits to their sovereign lands was the first step in establishing the key component of trust prior to conducting research on their lands. Adherence to their tribes' protocols required a relational approach that encouraged dialogue and engagement, before formal interviewing. Site visits also provided critical insight into their geographic location. Understanding the geography in relation to their ICT needs was an essential step before conducting the interviews. For example, having knowledge of their reservation's geography was important for generating qualitative data about their ICT agreements with Large Capacity Carriers. This approach was important, because Puyallup and Tulalip's geography, cellular signal access and interview data were critical for corroborating LCCs' cellular coverage maps.

Large Capacity Carriers (LCCs) have varying telecom subscription programs that fit the common vernacular, "you get what you pay for." This appears to be true in the case of cellular

subscription to cellular signal strength ratio within the Puyallup and Tulalip lands. My initial research activity included first-hand experience of ICT or cellular signal access at Tulalip and Puyallup lands. My personal experience with cell signal usage provided an awareness of the varying levels of cellular signal access within Puyallup and Tulalip Tribes. Therefore, I established a nominal scale with the labels “high” and “low” to represent signal strength. The nominal scale facilitated communication of my observations of cellular signal strength using the T-Mobile Cellular Network at Puyallup and Tulalip. The “high” signal access represents up to 4/5 signal bars and “low” represents 3/5 or below. Large Capacity Carriers do not have a standardized algorithm to identify the true signal strength. Using the digital bars in cellular phones is not an exact assessment method.³⁷ However, for purposes of this study, the nominal scale was sufficient for analyzing cellular signal data in understanding the tribal leaders and tribal members’ perceptions of ICT.

Establishing rapport with Puyallup and Tulalip Tribal Council members required developing a respectful and consistent relationship with them, because they are elected officials serving as part of the tribes’ governing body. The importance of their decision-making status, within their tribes, was the motivation behind interviewing them for this research study. As previously noted, their decision-making power includes the responsibility of providing ICT and telecom for their members.

³⁷ What do the signal bars on your smartphone actually mean? We asked an expert. Retrieved from <http://www.digitaltrends.com/mobile/what-do-the-bars-on-your-smartphone-mean-we-asked-an-expert/#ixzz4TE9bzpk0> on March 9, 2015.

3.1.2 Interviews

Puyallup and Tulalip Tribal Council members were interviewed using open-ended semi-structured instruments that included pre-established guiding questions. The questions were designed to elicit interviewees' comments, thoughts and experiences with ICT at Puyallup or Tulalip Tribes. The interview questions were also deliberately designed to serve as a vehicle for establishing rapport during the description of the research project. The interviews were the primary instruments used to gather the data needed for the comparative case studies and to produce summative data analysis.

The initial selection of Puyallup and Tulalip Council member interviewees occurred through my participation at community events and at Pacific Northwest American Indian and Alaska Natives professional organizations conferences. Selection criteria for Puyallup and Tulalip interviewees included the following: council members were required to have decision-making power within their respective tribes and identify as members of Puyallup or Tulalip Tribes and ownership of enabled mobile phones. The selection criteria did not include telecom literacy, as the literature review noted that tribal governance does not ensure telecom or information literacy due to the digital divide. Dr. Danica Miller, Puyallup member and University of Washington – Tacoma Professor, comment is representative of this concern when she expressed, “I don’t even know what telecom means.”

My participation at Affiliated Tribes of Northwest Indians (ATNI) conferences was important for achieving appropriate culturally respectful face-to-face introductions to Puyallup and Tulalip Council members who may have been willing to discuss this study. For example, I

approached Senator John McCoy, 38th District Washington-Tulalip, in 2013 to request a meeting, but was not able to meet with him until 2015; two years after my initial request. Interviewing Senator McCoy was critical for my research, because he has served for many years in leadership roles at Tulalip Tribes and within Washington State government. He provided key data points during our interview that are at the core to my findings. Additionally, Senator McCoy introduced me to those Information Technology managers that were part of the team who deployed and propagated Tulalip Tribes' innovative telecom infrastructure and the resulting Salish Networks company.

The initial step for interviewing tribal members was to formally request permission from tribal leadership; I followed this protocol and council members approved my request. They did not specify or limit my interview access of their tribal members. Puyallup and Tulalip Tribal member interviewee selection was conducted through face-to-face conversations. I approached them individually at social activities and events, such as community celebrations. Initial interview requests were made after making appropriate introductions that included a discussion of my ethnicity, family history and research purpose.

3.1.3 Document Analysis

The complexity of conducting a comparative case study of Puyallup Tribe of Indians and Tulalip Tribes was evident when I requested pertinent ICT documentation. Both tribes value their privacy and clearly expressed their unique individual and sovereign tribal status.

Access to Puyallup and Tulalip Tribes' decision-making documents and correspondence was limited due to the private nature of their documentation. However, I had access to public documents from Affiliated Tribes of Northwest Indians (ATNI) and relevant documents from ATNI Energy Experts. These documents included ATNI and individual tribes' correspondence with The Federal Communication Commission (FCC), National Telecommunication Information Association (NTIA), and US Communications Policy Hearings.

3.2 Research Design Phases

My research agenda included open-ended semi-structured interviews of two Puyallup and two Tulalip Tribal Council members and two tribal members per respective tribe or a total of eight interviews. The questions posed to council members were developed to elicit comments on their information needs and considerations prior to making decisions about ICT and telecom for their members. Tribal member questions were designed to understand their awareness and opinions of ICT and telecom. In addition, the questions aimed to attain tribal members' perceived impacts of their respective tribal councils' decisions about ICT and telecom on their daily lives. The interview questions are located in Appendix A and B.

Puyallup and Tulalip Tribal member questions were also configured in an open-ended semi-structured format to stimulate informal conversations about the role that ICT and telecom played in their daily lives within their respective tribes. The intent of the interview questions was to engage interviewees in conversation.

Interviews, observations and documentation data were organized in a manner that facilitated development of individual case studies for Puyallup and Tulalip Tribes. Social economics principles, such as base studies, supplemented the analysis where appropriate and in accordance with the interviewees' responses and comments. The research findings were not achieved through strict adherence of pre-established phases. The research intent was meant to fuel open-ended conversations and avoid biased inquiry.

3.2.1 Research Design Considerations

A necessary step in pursuing this research was a discussion of my research goals with Native American and Alaska Native scholars at the University of Washington, Seattle. In addition, I also met face-to-face with AIAN ICT experts to discuss my proposed research project. The approval of AIAN Scholars and ICT experts was greatly appreciated and required prior to requesting a University of Washington Human Subjects Review.

The relationship between Pacific Northwest Tribes and academia is impacted by the consequences of historical land and cultural appropriation issues. As such, it was necessary to establish trust through a good heart³⁸ prior to undertaking research at Puyallup and Tulalip Tribes.

Participation at Puyallup and Tulalip community events was necessary to build personal relationships. Puyallup and Tulalip Tribes expressed that they require researchers to spend time at their sovereign lands so that researchers gain an understanding of tribal sovereign and their

³⁸ Good heart is in relation to holism. The Indigenous philosophical concept of holism provides a context for Indigenous storywork (Archibald, 2008). It represents the interconnection between the intellectual realm, spiritual realm, emotional realm, and physical realm that form a healthy person and a healthy community.

political power. In other words, researchers are required to learn and respect tribal traditions, customs and ways of knowing prior to opening a research agenda dialogue. My personal indigenous representation and understanding of Puyallup and Tulalip cultures accelerated my access to decision makers at Puyallup and Tulalip. However, it took five calendar years of relationship building prior to conducting the interviews.

Establishing trust with Puyallup Tribe required sustained personal engagement and participation in cultural activities that included Pow-Wows³⁹ and tribal drum healing ceremonies.⁴⁰ Partaking in tribal community activities was critical in establishing credibility and exhibiting a good heart in order to assure I did not intend harm and was prepared to be held accountable. Interviewing Senator John McCoy proved to be instrumental for attaining conversations with other Tulalip Tribes members. His reputation as a respected tribal leader and political dignitary was evident when Tulalip members inquired as to who else I had interviewed for my research project.

Participation at Affiliated Tribes of Northwest Indians (ATNI) provided opportunities to speak with ICT and telecom AIAN experts. Pacific Northwest (PNW) Tribes, including Tulalip and Puyallup, attend these conferences. Their participation provides a joint voice for working to

³⁹ “Pow wows are a time to continue and preserve traditions and to dance to the heartbeat of the drum. Powwows are either competition (dancers compete in several categories for prize money) or traditional (no competition dancing). Powwow Time keeps many Native American traditions alive and also provides an exciting and informative environment for non-native people to experience first hand about American Indian culture. Retrieved from <http://powwow-power.com/what-is-a-powwow/> on July 7, 2016.

⁴⁰ Drum healing ceremonies. “The drum is a powerful instrument. Indigenous people throughout Turtle Island refer to it as the heartbeat of Mother Earth. It is used in many spiritual and sacred ceremonial practices. Some say the beat of the drum has the power to change natural elements, including the weather.” Retrieved from <http://www.nativepeoples.com/Native-Peoples/July-August-2009/Drums-Heartbeat-of-Mother-Earth/> on December 14, 2016.

bridge PNW Tribes' digital divide. That goal is evident in ATNI's Constitution as it states, "to preserve for ourselves and our descendants rights secured under Indian treaties and agreements with the United States, and all other rights and benefits to which we are entitled under the laws and Constitution of the United States and the several States, to enlighten the public toward a better understanding of the Indian people, to preserve Indian cultural values, and otherwise promote the welfare of the Indian people, do hereby establish this organization (ATNI Constitution, 2011, p.1)."

American Indian and Alaska Native (AIAN) organizations, such as ATNI, provide a platform for collaborating and determining policies relevant to Pacific Northwest Tribes (PNW). They serve as a representative body, governed by PNW tribal council members, to expand the capacity of their nations through optimizing tribal business. The Affiliated Tribes of Northwest Indians divides tribal business into 20 unique committees. The ATNI Energy and Telecommunication committee provides tribal subject matter expertise and representation on issues related to Information Communication Technologies and telecom in Indian Country.

Tribal energy and telecom leaders identify Pacific Northwest Tribes' energy infrastructure and needs, then submit one unified message to federal and state governments for action. For example, the ATNI Energy and Telecom Committee partners with Washington State's Bonneville Dam⁴¹ to ensure appropriate representation. Affiliated Tribes of Northwest Indians state that, "Over the years ATNI's energy work has expanded to regional and national

⁴¹ "The project's first powerhouse, spillway and original navigation lock were completed in 1938 to improve navigation on Columbia River and provide hydropower to the Pacific Northwest. A second powerhouse was completed in 1981, and a larger navigation lock in 1993." Retrieved from <http://www.nwp.usace.army.mil/Locations/Columbia-River/Bonneville/> on May 4, 2015.

policy processes related to tribal energy, tribal electrical utilities, and transmission issues (ATNI, 2016).”

Participation at ATNI Information Communication Technologies and telecom conversations was critical to achieve the trust of PNW Tribes. Therefore, I attended six ATNI Conferences and presented on Science, Technology, Engineering or Math (STEM) Education Programs, which included rocketry telemetry science.⁴² My presentations at ATNI formally introduced me to tribal council members and Tribal Elders.

Tribal advocates were also instrumental in discovering digital divide issues at PNW Tribes. Tulalip owned Salish Networks Operations Manager, Travis Hill, was interviewed to obtain details on the history of Salish Networks and the ICT model used to assure digital connectivity at the Tulalip Tribes. Interviewing Mr. Hill provided insight into the current infrastructure development challenges based on governmental legislation and capital investments.

The literature review chapter provides detailed information on the documents and materials analyzed. However, I am highlighting the 1995 *Office of Technical Assessment Report titled Telecommunications Technology and Native Americans: Opportunities and Challenges*, within this chapter because it prompted my research questions and led to this study.

⁴² Rocket telemetry is remote measurement of the aerosphere or space using instrumentation. Data may be used for meteorology for example. Retrieved from <http://adsabs.harvard.edu/abs/1987STIN...8913455> on March 9, 2015.

The 1995 OTA Report includes a chronological history from 1970-1994 of US Presidential policies on government-to-government relationships with tribes. The policies reaffirmed the sovereignty of tribes and included the definition of US trust responsibility to AIAN Tribes whose lands were colonized. The report's chronological policy history was a starting point for understanding the way that digital divide disproportionately continues to impact Puyallup and Tulalip Tribes.

The report identifies a complex "trust responsibility" that involves policy, regulation, rulemaking and decision-making. In fact, the 1995 OTA Report identified decision-making as a key component for decreasing the digital divide. This report inspired me to pursue the role of tribal leadership in the digital divide and provided a framework for conducting ICT and telecom research with American Indian and Alaska Native Tribes, thereby including Puyallup and Tulalip Tribes. The 1995 OTA report's emphasis on the "trust responsibility" was critical when interviewing tribes concerning their ICT and telecom situations. My research process was informed by the 1995 OTA seminal report, because it was one of the first policy reports that focused on the digital divide experienced by American Indians and Alaska Natives.

In summation, my research presents a comparative case study of Puyallup Tribe of Indians and Tulalip Tribes. The goal of this methodological approach was twofold. First, to identify the information needs of tribal council members prior to their decision-making process concerning Information Communication Technologies and telecommunication adoption, deployment and propagation on their sovereign lands. The second part of the research is an examination of tribal members perceived impacts of ICT and telecom decisions on their lives.

My own indigenous background enabled a philosophical understanding of American Indian and Alaska Natives' sovereignty and right to self-determine. I was more prepared to appreciate and respect their worldviews and cultural viewpoints on respect, humility, humor and kindness. My cultural understanding was especially critical for earning their trust so that they may see the benefit of my research work within their lands. My professional background, that includes college-level computer information systems instruction, also appeared to influence my interviewees' willingness to participate in my research project. For example, Puyallup Tribal Council member, David Bean, stated "We need to train our people to do as you are doing, we don't have enough prepared Indian Kids ready for the technological changes."

Chapter 4 Findings

Puyallup Tribe of Indians (Puyallup) and Tulalip Tribes (Tulalip) are two Pacific Northwest Tribes (PNW) that are underrepresented in the Information Age. This chapter presents the findings from my study of ICT decision-making by Puyallup and Tulalip Tribal Councils and the consequences of those decisions on their communities.

4.1 Findings Background

Puyallup and Tulalip Tribes are at two distinct points of ICT saturation. Tulalip owns a data center that provides ICT for their reservation members and also offers communication services to surrounding communities. Their ICT drive produced Salish Networks⁴³ which is responsible for technology support and cellular digital signal propagation within Tulalip Lands and surrounding communities. As of 2015, The National Broadband Map⁴⁴ (Figure 5) identifies Puyallup's reliance on five mainstream Large Capacity Carriers (LCC)⁴⁵ that fulfill their ICT needs and accompanying technical support.

For purposes of the study, I identify Puyallup and Tulalip Tribes as urban based in their geographic locations. Additionally, ICT is the umbrella term for communication technologies and includes telecommunications (telecom), signal, digital signal and communication.

⁴³ Salish Networks states, "We are a locally focused Internet, telephone and communications infrastructure business devoted to providing high-value, reliable and transparent services to our clients. Our dedicated workforce is proud to provide customers a variety of services in the Tulalip, Marysville, and North Puget Sound region. Salish Networks is a division of the Tulalip Tribes of Washington State with over 10 years of telephone, internet, infrastructure and cabling experience. We are committed to delivering quality voice, infrastructure and data connectivity to the North Puget Sound. Our customers include state, local government, private business, and educational institutions." Retrieved from <http://www.salishnetworks.com/Home/About> on June 4, 2015.

⁴⁴ National Broadband Map provides an actual map available for analysis of broadband availability across the United States; see Figure 5.

⁴⁵ Large Capacity Carriers is term used by Pacific Northwest Tribes to identify large cellular service corporations, such as AT&T, Verizon and T-Mobile for example.

A key element in my research is the need to account for tribal population size and geography, as they impact decision-making on ICT. For example, population size and geography facilitate calculation of telecom take-rates.⁴⁶ In this case, take-rate is the amount of people living within an area, that had an opportunity to consume telecom, divided by the number of people that actually did consume telecom. The calculation result is the take-rate or how many people actually took or subscribed to telecom. Furthermore, the take-rate provides tribal councils with quantifiable data for ICT discussions with the federal government.

Demographics and geography provide context for tribal ICT decision makers as they consider deployment and proliferation within their lands. Puyallup Lands are located approximately seven miles southeast of the City of Tacoma. Tacoma is the third most populated city in Washington state. Tulalip Lands are situated approximately 40 miles north of the City of Seattle. Seattle is the most populated city in Washington state and both cities are located in the Puget Sound. Puyallup and Tulalip Tribes are Coast Salish Tribes whose traditions are based on oceans, waterways and canoe journeys. They are casino gaming tribes that provide per capita⁴⁷ disbursements to their members.

⁴⁶ Take rate, in this case, represents the number of people that have the option to subscribe to a telecom service provider divided by those that actually do. Retrieved from <http://kpilibrary.com/kpis/take-rate> on April 9, 2016.

⁴⁷ Per-capita payments are made to American Indians and Alaska Natives by the US Government to use reservation lands for project and/or mineral leases, etc. These payments are based on the fact that the US hold reservations lands in trust. Retrieved from <http://www.narf.org/frequently-asked-questions/> on April 10, 2016.

Case studies of both tribes were conducted to address the research questions:

1: How do tribal council members decide to implement ICT and telecom in Indian Country?

1.1 What were the considerations tribal council members reflected on prior to implementation?

2: What are the impacts of those decisions on their tribal membership?

2.1 What do tribal members think about their telecom access?

The data acquisition tools included, semi-structured interviews for pursuing insight into the complexity of each tribal councils' decision-making process on ICT. Tribal members were interviewed to capture their perceived impact of their respective council's ICT decisions.

The interview feedback included tribal councils' information needs prior to making decisions on the design, deployment and propagation of ICT on their respective lands. Those findings were complemented by descriptions of ICT experiences at the respective tribes. The individual case study analysis provided data for determining common themes. The common themes were derived by inductive reasoning and supplemental use of Atlas.ti qualitative analysis software. The data analysis produced the following common themes:

1. Sovereignty
 - 1.1. Need for culturally appropriate systems and experts
 - 1.2. Privacy
2. Economics
 - 2.1. Affordability
 - 2.2. Employment
3. Geography
4. Information Poverty

5. Federal Communications Commission
 - 5.1. Tribe-to-Tribe and Within Tribal Digital Division
6. Tribal Broadband Fund

The common themes were derived from data analysis of four semi-structured interviews. Puyallup interviewees included University of Washington -Tacoma Professor, Dr. Danica Miller (Puyallup) and Puyallup Council member David Bean. Tulalip Tribes' interviewees were Senator John McCoy, WA 38th District, and former Tulalip Tribes Information Technology Employee Robin Kennedy. Supplemental interview data was collected from Tulalip Tribes owned Salish Networks' Operational Director, Travis Hill; Quileute Nation Elder Wally Jackson; IT Director for Quinault Nation, Randell Harris (Tlingit); Tulalip Tribes Chairman, Melvin Sheldon Jr. and one anonymous Confederated Tribes of the Colville Reservation member. Two Puyallup and two Tulalip tribal members were interviewed but preferred to remain anonymous. I refer to them as Participant 1 or 2 per tribe. For example, Puyallup Participant 1 or Tulalip Participant 2 or Colville Participant 1.⁴⁸

Tribal Information Communication Technologies decision-making document analysis was conducted on literature made available by Affiliated Tribes of Northwest Indians (ATNI), Federal Communications Commission (FCC) and other critical organizations such as the National Congress of American Indians (NCAI) and Library of Congress. The combination of interviews and document analysis constructed bonded results that will be shared with Puyallup

⁴⁸ A tribal member from the Confederated Tribes of the Colville Reservation was included in my dissertation, because of his participation at Affiliated Tribes of Northwest Indians Conferences. He desired to provide insight on ICT access between "urban" and "rural" tribes within Pacific Northwest Tribal.

and Tulalip Tribes and the other 27 federally recognized tribes of Pacific Northwest (PNW). In addition, my work will also be made available to ATNI Energy Leaders.

The selection of Puyallup and Tulalip Tribes represents an example of two Pacific Northwest (PNW) Tribes engaged in ICT decision-making processes. The selection was not made to normalize all PNW Tribes ICT legislative processes. My dissertation identifies ICT similarities and differences between these two PNW Tribes. However, I aspire that my work will trigger future research on ICT and decision-making in other tribes.

4.2 Sovereignty

Tribal sovereignty includes tribal rights to self-determine without interference from mainstream society. This guided the research process and served as the common denominator for all research activities. As such, the interview questionnaires were designed to serve as a springboard for conversation. Initial interviewee responses were less insightful than their ancillary follow up comments. For example, council members were posed the question, “Which organizations played a role as you determined telecom implementation at (Puyallup or Tulalip) on the reservation?” Their answers were short and generic, for example: US government agencies (not identified); “FCC”; IT professional from the Tribe and Large Capacity Carriers (LCC) providers such as at Verizon and AT&T. Both Puyallup and Tulalip Tribal Council members commented on the critical need for tribal specific IT professionals to serve as gatekeepers⁴⁹ and translators of technology into culturally responsive terms. The importance of

⁴⁹ Gatekeepers in this case, refers to individuals with technical knowledge who are responsible for facilitating tribal ICT decision-making. The conceptual framework is based on Dr. Cheryl Metoyer’s work entitled Gatekeepers in Ethnolinguistic Communities (1993).

the tribes' governing their own decision-making, as sovereign nations, was consistently embedded in these responses.

Senator John McCoy stated, "We (American Indians and Alaska Natives) need to retrain to learn culture, but need to balance between various environments to understand how to fit in." He further stated that, "languages and careers have the same language and we need to train our people to navigate those languages so that they have opportunities to take these high paying jobs...there is a need."

Puyallup Council member, David Bean, responded to the challenges of ICT decision-making in the following way, "I think the challenge is getting everyone on the same page and everyone processes information a little differently. Some are visual people, some are verbal, our culture is rich in oral traditions. People are more comfortable hearing stories in oral story instead of written story. Me, I need everything, I am visual person so the challenges kind of communicate into a seven headed animal, that's how I would describe our council, not in a negative way, just a seven headed animal each with different characteristics and ways of processing information." He further commented that IT professionals would benefit from having an awareness of Puyallup traditions to ensure the council receives appropriate information for decision-making.

The shortage of local IT professionals was identified by the Affiliated Tribes of Northwest Indians (ATNI) in the 2015 memorandum to Mr. Larry Strickling, Administrator National Telecommunications and Information Administration and Ms. Lisa Mensah, Under

Secretary for Rural Development United States Department of Agriculture. The memorandum states, “Obstacles arise from the inconsistency in definitions (broadband, rural, etc.) across agencies. This makes it even more difficult to be successful in securing necessary funds to deploy infrastructure and provision broadband services. Specific funds are needed to support local and regional capacity building and training around technology. Deals are done locally with local private/public partnerships and the success is building a sustainable self-help network (ATNI Memo, 2015).”

4.2.1 Need for Culturally Appropriate Systems and Experts

Puyallup and Tulalip Council Members commented that effective technology translators or gatekeepers, are needed to provide clear culturally connected examples that can transfer ICT nomenclature and engineering into oral traditions of science.

Tribal information communication gatekeepers are necessary, because they understand tribes’ complex systems of knowledge and are held culturally accountable for their ICT advice. During the 2016 ATNI Winter Conference, Randell Harris (Tlingit), provided an example of the intersection between cultural knowledge and ICT gatekeeping.

Mr. Harris explained a situation where he was asked to serve as an impromptu ICT gatekeeper during a 2015 Makah Tribal Council meeting. His topic was on the need for ICT infrastructure updates due to noise interference with their cellular digital signal. As a gatekeeper,

he correlated electromechanical⁵⁰ infrastructure failure with the loss of cellular signal access and strength by describing the way rain clouds have storm potential. He further identified the impact of storms on the harvest of fish and other ocean food (Randell Harris, IT Professional Quinault, ATNI Interviewee, 2016). He commented, “The council wanted to know why we wanted money to update something that already works (referring to cellular signal towers). I immediately turned to the ocean and identified how some clouds eventually have rain, then rain changes what happens in the ocean with fish. This is no different than what happens when rain and storms impact cellular signal.” Thereby, Mr. Harris’ gatekeeping provided the Makah Tribal Council with a cultural explanation of the way inclement weather interrupts the cellular telegraphy⁵¹ microwave.⁵²

The need for IT experts and gatekeepers was evident by the lack of AIAN trained professionals available for me to interview. Tribes aspire to train their own members so that they may serve as ICT gatekeepers and operators within their lands. Senator John McCoy’s interview produced striking points that were important for this research. Specifically, he underlined that the minimal number of trained American Indian and Alaska Native ICT professionals is a critical gap. His concern is based on his political knowledge of Washington State and Pacific Northwest ICT policies and laws. He also has personal subject matter expertise from his formal training in the US Airforce. Senator McCoy’s insight and comments proved to be fundamental to my

⁵⁰ Electromechanical infrastructure refers to a system that is actuated or controlled by electricity. In this case, I am referring to cellular towers. Retrieved from <http://www.yourdictionary.com/electromechanical#3HW1Ozm7g7WS8VMh.99> on February 8, 2015.

⁵¹ Telegraphy refers to “an apparatus, system, or process for transmitting messages or signals to a distant place, especially by means of an electric device consisting essentially of a sending instrument and a distant receiving instrument connected by a conducting wire or other communications channel.” Retrieved from <http://www.dictionary.com/browse/telegraph> on January 8, 2015.

⁵² Microwave, see Glossary.

understanding of the complexity behind Pacific Northwest tribal council members' responses. As such, his comment, "We are just one step above smoke signals" is the source of my dissertation's theme and is included in the title. Senator McCoy further elaborated, "This (ICT) was all new to us and there aren't very many of us looking at this stuff. We need our people to have more training and learn the language of technology."

Senator McCoy expressed concern that all 29 Pacific Northwest (PNW) tribes still struggle to receive appropriate telecom connectivity. He posits that the lack of digital signal negatively impacts AIAN's online education opportunities, Emergency Communication Networks (ECN), tribal civic engagement and representation. He states, "How can we do the work for the tribe when they can't tell us what they need."

Puyallup and Tulalip leaders stated that Large Capacity Carrier business leaders need cultural training in the Pacific Northwest Tribes' sovereignty. Miscommunication occurs, because economic ICT transactions are generally cryptic and lack cultural awareness. Senator McCoy discussed the importance of providing culturally responsive ICT information for decision-making through his personal experience. He reflected on an ICT presentation he gave at Tulalip Tribes Council meeting where he recalls giving culturally relevant respect to Tulalip Council members. For example, he properly introduced himself by providing his family lineage and his ancestral connection to the Pacific Northwest. Through his cultural awareness he opened a conversation on ICT investment at Tulalip Tribes. The result of his presentation on ICT is an annual eight million dollar budget for ICT projects at Tulalip Tribes. Senator McCoy attributes his successful pursuit of ICT at Tulalip Tribes to his cultural awareness that facilitated

appropriate and accessible communication of ICT nomenclature. Moreover, his focus on establishing trust with tribal leadership was key to starting a conversation.

There are many non-Native American technologists that have taken time to learn how to exhibit respect for tribal leaders and elders. Travis Hill, Operations Manager Salish Networks, has developed positive working strategies with Tulalip Tribes' Council, because he is aware of the acute digital divide Tulalips endure and their underrepresentation in the Information Age.

The Tribal Elders whom I spoke with, identified the need for my type of research and expressed their desire to include tribal youth in this type of research. Tribal leaders desire to engage tribal youth in cultural traditions within the Information Age. Quileute Tribal Elder Wally Jackson stated, "We've lost that communication in family. Family togetherness because of modern technology. It hurt us and it hurt our culture and traditional ways so we've been working hard the last few years and we had a weekly drumming and singing for the healing and to help carry on the culture and traditional ways."

Quileute Elder Jackson's comment that modern technology hurts American Indians and Alaska Natives reminded me to be sensitive to this concern and avoid a skewed pro-technology posture. He informed me that not all technology is good, but that it can indeed be adversarial to AIAN traditions when not appropriately managed.

Culturally appropriate systems, including research activity, requires respect for the tribes' privacy. This was confirmed when interviews with Puyallup Tribal Members and Council

members proved to be more difficult than I anticipated. My meeting requests were not addressed for six months and I encountered hesitation when inquiring about their availability. It took over six visits to Puyallup Tribe of Indians prior to securing a council member interview. Tulalip Council members were more readily available to discuss ICT and telecom. However, they preferred to remain anonymous.

Due to the nature of Puyallup ICT and proximity to the City of Tacoma, the Puyallup Tribe of Indians perceive that their privacy is impacted by subscribing to affordable cellular plans. Puyallup interviewees were hesitant to answer questions on ICT access and periodically paused to inquire as to why I wanted to know about their telecom situations. Puyallup Participant 2, stated, “I don’t even know if I can talk to you. I have to ask my supervisor if I can even do that. I’ve lived in the reservation all of my life and I am Ok with what I have.” Puyallup Participant 2’s comment was consistent with other Puyallup Members’ overt concern with privacy. They appeared to become comfortable once I stated that the interview was complete. Afterwards, they openly discussed their ICT and telecom experiences as well as commented on the desire for Puyallup owned ICT infrastructure. Tulalip Tribes Members also expressed concerns with their privacy. They were even less open to discussing actual ICT infrastructure. The Puyallup and Tulalip Members’ privacy concerns appeared to include minimal experiences with tribal decision makers. For example, Tulalip Participant 2 stated, “I don’t even know what they are up to.”

Puyallup Member, Dr. Danica Miller, explained that privacy is important, “It’s a matter of knowledge in my experience. I don’t know about others, but know that I don’t want all my

thoughts to be public. We have our own privacy and I have my own way of ensuring that it is so. However, we are required to use what is available.”

4.4 Economics

The impacts of Information Communication Technologies on American Indian and Alaska Natives’ economic development requires analysis of each tribe’s economy. My research considered Puyallup and Tulalip social economics, economic base studies, and business economics. These areas of study are more closely aligned with Information Communications for Development (ICT4D) rather than ICT decision-making. However, considerations of tribal economics was important because the tribes identified economics as key for most areas of decision-making. More importantly, the tribal council members interviewed in this study, revealed that ICT was as critical component for their respective tribe’s overall economic development.

Tribal economic development endeavors include Information Communication Technologies investment and proliferation on tribal lands. Senator McCoy adamantly addressed the negative consequences of the digital divide on tribal business endeavors. He stated, “When others have online presence they can buy, sell and make a living, but we (referring to AIAN and specifically Tulalip) have limitations even now. We have ideas and business endeavors, but we can’t even connect to fill out a business license.” Senator McCoy correlated the tribe’s unequal participation in the Information Age with unequal investments opportunities with Large Capacity Carriers (LCC). He stated, “Large telecoms receives funding dollars, but we don’t see the investment. We can do the work ourselves, but the money goes to them.”

Puyallup Council member, David Bean, agreed with Senator McCoy's comment: "Before we make a decision on something like that (ICT) we first look at where that fits on our overall economic development plan; how that fits. You know our goal is to diversify our tribal economy. Our goal is to try to create meaningful employment and careers for our people in addition to expanding our income base. So how does this improve our community, would be one of the first questions that I would ask. How does this benefit our community? What kind of the investment are we expected to make and what is the return?"

In other words, council member David Bean explained that a review of economic circumstances, in his case for Puyallup Tribe of Indians, was necessary prior to undertaking ICT projects. His comments underline the importance of including employment opportunities as part of Puyallup's overall investment and economic growth plan.

4.4.1 Affordability

Affordability of ICT digital connectivity hardware and signal access was clearly the strongest theme that emerged from the interviews. Interview data indicated the disparity between mainstream and tribal cellular telecom subscription options and digital signal access. Puyallup Council member David Bean stated the following when asked about affordability: "Oh wow, I always look to find ways, just by nature. I find ways to get the best possible deal. So affordability, you know, our folks aren't the richest. We have 27,000 members in our service area. We have 5,000 members. However our services go to 27,000 or so and that comes with varying levels of employment, education. And so affordability is definitely something we look at. Can we provide this to our service population at a reasonable rate and still maintain

operational cost, because there are costs with every operation. So that would be a factor. I would need to know more about the industry to give you a better answer.”

Information Communication Technology affordability was a fundamental consideration for tribes as they update antiquated telecom systems to more stable high bandwidth⁵³ digital signal infrastructure. Tribal geography also impacts ICT affordability. Their geographic distance from telecom nodes⁵⁴ increases subscription costs, because additional point-to-point repeaters are needed to amplify signal (Figure 6). For example, the Tulalip Tribes’ land is approximately 40 miles north of Seattle and spans remote areas west of Interstate 5. Their LCC subscriptions do not guarantee stable and consistent telecom connectivity throughout the reservation lands. Affordability is, therefore, impacted by the signal strength as a consequence of the interaction between geolocation and ICT infrastructure geography. Former Tulalip Tribes IT Employee, Robin Kennedy (Spokane), stated, “even with the data center, people didn’t know how to connect. It was new and not really understood by the community. They are all around the tribe and some didn’t even travel close to the casino so they didn’t have access.”

Ms. Kennedy’s comment described an intra-tribe digital division that also surfaced as a recurring theme throughout the interviews and informal conversations with tribal members. Puyallup Member, Dr. Danica Miller, defined her telecom end goals as a balance between a cellular service subscription, that included high bandwidth connectivity, and affordability.

⁵³ Bandwidth is also defined as the amount of data that can be transmitted in a fixed amount of time. Retrieved from <http://www.webopedia.com/TERM/B/bandwidth.html> on May 14, 2016.

⁵⁴ Telecom nodes are processing locations. In this case, a telecommunication node may be located in or on a building such as AT&T. Retrieved from <http://www.webopedia.com/TERM/N/node.html> on June 5, 2016.

Some Puyallup Tribal members preferred to speak anonymously. They did not provide insight into their experiences with cellular access nor with the impact of their council's ICT decisions. However, one tribal member, Dr. Danica Miller provided perspective of ICT through her personal use of cellular infrastructure and devices on the Puyallup reservation: She stated, "I hate talking on the phone. I would like to say that it's not that way. I avoid talking on the phone at all costs. I'm more comfortable texting or e-mailing and then certainly talking in person. So when I'm speaking...um.. what makes me a good teacher is the fact that I am always asking questions as opposed to telling or saying things. But there is definitely and then you can see.. (gasps).. how that um that dialogue is different for persons with different backgrounds you know."

4.4.2 Employment

Robin Kennedy served as a Tulalip IT Professional and Business Analyst during the inception and deployment of ICT at the data center for Tulalip Tribes. She described herself as a business analyst who focused on community advocacy for Tulalip members as their council made decisions regarding ICT. As a community advocate, she established trust by participating at Tulalip cultural events. She obtained the community's perceptions of ICT and technology needs through her personal involvement. However, her insights expanded beyond ICT. She established rapport with Tulalip members so that they felt comfortable sharing their sentiments and concerns about culture and technology. Consequently, Ms. Kennedy learned that Tulalip members believed that their council needed to be more mindful of the tribe's ancestral beliefs and should integrate them into the ICT decision-making process. For example, Ms. Kennedy stated: "The council heard rumors that new technology jobs were going to non-members. That

the hiring practices were rigged so that non-Tulalip members would get those jobs and leave the community out of the opportunities.” She explained that the hiring practices rumors delayed ICT projects given the perceptions that high paying technical jobs were prefilled.

Ms. Kennedy commented: “They (Tulalip Council) didn’t want us here (outside Tulalip Employees) but we were trying to do a good thing. That took the drive away, because it felt like jobs were in jeopardy.” She further described situations when she had to demystify technology to avoid sending messages that might have appeared coded, (i.e., strategically geared towards keeping jobs away from the tribe). She expressed that her actions and reflected on her goal to be, “just like them, trying to figure out what I could do and what was out of my control. Because I also had to learn...this was new to all of us at that time. Professor Erdly (University of Washington, Bothell), really helped us understand consequences and connected us with people he knew, but we just didn’t have the expertise.”

4.5 Geography

Puyallup’s digital signal access is tied with the City of Tacoma’s ICT infrastructure. Therefore, Puyallup (unlike Tulalip) is able to connect to a more consistent and stable signal throughout their metropolitan reservation areas. As of 2015, the digital communication signal services are provided by five LCCs that offer varying cellular signal subscription plans for Puyallup tribal members. Puyallup’s geographic area, however, limits their telecom choices to those five companies. The service provider limitation creates monopolies that railroad tribal members into subscribing to their networks or risk having no connectivity. This poses a significant problem for tribal members with low resources and income levels. This phenomenon

was voiced by Puyallup member 1 (PA1) as follows, “If you don’t have Verizon then you aren’t connecting.” The interviewee was responding to my question regarding the most affordable and best cellular signal service provider at Puyallup.

4.6 Information Poverty

The first open-ended interviews I conducted included Senator John McCoy, Washington 38th District, and Salish Networks Operations Manager Travis Hill. Upon retirement from the US Air Force, Senator McCoy became an ICT trailblazer at Tulalip Tribes by establishing a data center and the ensuing IT company named Salish Networks. The mission of Salish Networks is to “offer phone and internet services to residents and businesses of Tulalip, Marysville, and other communities in the north Puget Sound.”⁵⁵ Senator McCoy became aware of the disproportionate access to telecommunication when he returned from the Air Force to Tulalip Tribes and stated, “I returned home and saw that we had nothing and that no one was talking about it, so I took action.” His personal motivation to produce ICT infrastructure at Tulalip evolved into large infrastructure investments by the tribal council.

Both Puyallup and Tulalip Tribes identified culturally appropriate translation of the complex language surrounding telecom systems as a fundamental starting point when making decisions on ICT. Translation of ICT technical terms provides support for decision-making that is congruent with the respective tribe’s Indigenous System of Knowledge.⁵⁶ For example,

⁵⁵ Salish Networks, About us. Retrieved from <http://www.salishnetworks.com> on March 4, 2015.

⁵⁶ Indigenous Systems of Knowledge (ISK) are philosophies and community practices that have formed the foundation for Indian survivance for generations. It acknowledges all of the parts that work together that shape our understanding and interactions in the world. According to C. West Churchman, a system is “a set of parts coordinated to accomplish a set of goals.” The individual parts of the system must work together and function properly to achieve a goal or set of goals. Indigenous systems of knowledge are grounded in the relationships of the

Puyallup member, Dr. Miller, stated that Puyallup members, “We are doing just fine (regarding ICT access).” She explained that, as a telecom subscriber, she believes that the current ICT and telecom systems are working appropriately. However, Puyallup Participants 1 and 2, expressed the need for local service providers to understand the local needs.

4.7 Federal Communications Commission

Puyallup and Tulalip Tribes consider the Federal Communication Commission as crucial to closing the digital divide. However, obstacles to solutions include trust and legislative respect for tribal sovereignty. At the 2016 ATNI Winter Convention, tribal leaders shared their sentiments on telecom inception and propagation within their sovereign lands. Tribal leaders from the Pacific Northwest described situations where government agencies, such as the FCC, provided digital signal services without inquiring about tribal specific needs and ICT infrastructure goals. For example, Senator McCoy explained that “Large telecom companies receive funding dollars because they are large capacity enterprises, but we see none of those dollars nor services.” He further explained that the FCC had previously offered ICT infrastructure funding opportunities to Tulalip Tribes, but didn’t ask if Tulalip had the expertise to submit the required type of funding proposals. He attributes the miscommunication to the government’s restrictive grant funding application model. This challenge is exacerbated by Tulalip Tribes’ limited proposal development expertise. I found that both Puyallup and Tulalip Tribes are in short supply of grant writers who have the capacity to translate tribal ICT needs into acceptable government proposal requirements and systems.

parts – land, place, language, history, ceremony, people, nature –for individuals and communities to live a balanced, good life.

Travis Hill of Salish Networks stated that LCCs railroaded Tulalip into “bad deals.” He stated: "If a private company is getting money from the government, it should be inclusive in who it serves." Mr. Hill detailed the struggles Tulalip Tribes had with Frontier Communications, when he was interviewed by *The Marysville Globe*. He noted that: "We've tried to work with Frontier, but they've dragged their feet. They've insisted there's no business case for them to invest in this area. They're literally not configured to allow us to order from them." He further stated, “We have to learn their (Frontier) systems and know how to work with them, but many times it is a one-way street. This creates more effort on our part as we don’t have the infrastructure and depend on them (Boxleitner, Marysville Globe, 2015, p.12).”

Indian Country is impacted by the digital divide due to the unequal distribution of ICT by the US government. While some tribes have “high” connectivity, others are still waiting or using wireline or have no access at all. The phenomenon of varying connectivity among tribes is referred to, by Affiliated Tribes of Northwest Indians Energy Leaders, as the “tribe-to-tribe digital divide.” This was an unexpected and important finding, because it succinctly identified tribal awareness of ICT differences within Indian Country. The ICT disparity within the Pacific Northwest Tribes has raised awareness for the tribes’ need to organize through Affiliated Tribes of Northwest Indians and to work together to bridge the tribe-to-tribe digital divide, and to demand that US government assist in this endeavor.

4.7.1 Tribe-to-Tribe and Within Tribal Digital Division

The tribe-to-tribe digital divide is evident between the Puyallup and Tulalip Tribes. The Tulalip Tribes’ created a data center and Salish Networks company to provide telecom services

for the tribe and its surrounding communities, which includes the City of Marysville. On the other hand, Puyallup Tribe of Indians has stable cellular access, but as of 2015 is bound by contracts with five LCC digital signal service providers.

Puyallup and Tulalip have high levels of digital connection when compared to Washington tribes located east of the Cascade Mountains. The tribes are aware of the tribe-to-tribe digital divide. Puyallup Council member David Bean expressed this phenomenon by stating, “I’ve seen the Tulalip provide various services to their communities. So how do we provide not just to our community but to our surrounding communities. So we can grow our economic base.” The tribe-to-tribe digital divide has been discussed at various ICT leadership venues that includes the Affiliated Tribes of Northwest Indians, National Congress of American Indians, Federal Communications Commission and other US Government agencies.

On the other hand, “rural tribes,” such as The Confederated Tribes of the Colville Reservation have less access than the “urban tribes.” Colville Tribe is geographically rural and its closest city is Spokane, WA. Colville’s limited LCC subscription choices require subscription to the AT&T Network in order to attain stable communication channels. Colville Participant 1, preferred to remain anonymous, stated, “Around here, you have to connect to AT&T, otherwise, you can just forget about connecting at all.” Consequently, the limited LCC subscription choices creates an airspace monopoly for AT&T.

The tribe-to-tribe digital divide was discussed during the ATNI 2016 Winter Convention. Pacific Northwest Tribes Energy Leaders, agreed at this convention, that the viable solution for

their digital division is ICT and corresponding microwave ownership. Energy Leaders voiced their dissatisfaction with the FCC's control over tribal airspace. Energy leaders reiterated their respective councils' complaint that their sovereignty was not being respected, because the government has not supported their desire to self-determine their ICT through a Tribal Broadband Fund. The conflict is further complicated by the fact that individual PNW tribe's airspace⁵⁷ is owned by the federal government. Tribal leaders and technologists are aware that they do not have legal rights to their airspace.

Affiliated Tribes of Northwest Indians members state that the FCC has a fiduciary responsibility to assure tribal signal connectivity for federally recognized tribes. Tribal leaders express that the government can show good faith by creating a Tribal Broadband Fund. The fund would provide capital for each tribe to finance and self-determine their own ICT endeavors (RAP-10-006, 2010). The digital divide will continue to expand due to the fast pace of technology. Until tribes have the power to self-determine their ICT, they will be dependent on mainstream private industries and the government to meet their unique needs. Randell Harris stated, "you know, you are talking about tribes that have connection (referring to Puyallup and Tulalip), but there are lots of tribes that don't. They are located in different parts of the state and have limitations, because they are not connected with technology people." Yet Professor Danica Miller, states, "We have what we need and I know that I can use my phone on the reservation." These statements do not conflict, because they are both expressing the tribe-to-tribe digital divide that further separates rural and urban tribes. In other words, tribes are aware of their differing and

⁵⁷ Airspace refers to the space that is above a country and that is legally controlled by that country. Retrieved from Merriam-Webster Dictionary <http://www.merriam-webster.com/dictionary/airspace> on April 5, 2015.

complex ICT situations and the lack of consistent an appropriate financial structures that limits their ability to bridge the digital-divide.

4.8 Tribal Broadband Fund

The intersection of ICT, technical expertise and geography has implications for investment levels. The National Congress of American Indians (NCAI) passed resolution #REN-13-064 in 2013 to highlight this issue. The resolution states in part, “decades of geographic isolation on tribal lands and related income disparity are real barriers that prohibit the adoption of broadband, quality of life enhancements, and deterrence of economic opportunities that are available to other Americans, which led to the adoption of the National Broadband Plan (NBP) by the Federal Communications Commission (FCC) in April of 2010, thereby affirming the sovereign rights of tribal governments to construct broadband networks, wireline and wireless, on tribal lands, and recommended that Congress establish a Tribal Broadband Fund (Tribal Initiatives, 2013) to incentivize and support sustainable broadband deployment and acceptable broadband adoption levels on tribal lands.”

Inconsistent messages and actions taken by the US and the FCC have damaged tribal trust. The first step towards bridging the digital divide is to establish a Tribal Broadband Fund (TBF). American Indians and Alaska Natives are more cognizant than the federal government of their members’ digital connectivity needs. The tribes understand that their members endure affordability issues that inhibit their participation in the Information Age. The tribes are also aware of tribal members’ desire for privacy, which for example, would allow them to share private ancestral knowledge in digital formats. The tribal members’ desire to share private

knowledge online is partially motivated by the desire to teach their ancestral ways of knowing to their youth.

The Pacific Northwest Tribes have requested the establishment of a Tribal Broadband Fund for decades, but the US has been resistant to invest and assign appropriate airwave frequencies. The Federal Communications Commission also acknowledges AIAN ICT disparities stating, “Recognizing that the telephone penetration rate on many tribal lands falls far below the national average, the Federal Communications Commission (FCC) has taken a series of steps, through initiatives and tribal outreach, to address the lack of communications deployment and subscribership on tribal lands nationwide. This guide was developed as part of the FCC’s ongoing Indian Telecommunications Initiatives (ITI) outreach effort and is consistent with the desire to establish government-to-government working relationships with American Indian tribes and Alaska Native villages (FCC, 2006).” National Congress of American Indians’ resolution #ABQ-10-061 states, “access to broadband service in poorly served areas will help bridge the technological divide, increase economic growth, and improve education, health care and the quality of life in these areas.”

Andrea Alexander (Makah), ATNI Energy Committee Chair, stated, “We need our own tribal broadband fund. We have been saying this for years, but the government and agencies are not understanding or refuse to partner with us. We are not asking for handouts; we are enforcing our self-determination (ATNI, Energy Program Fall Annual Convention, 2016, September).”

American Indians and Alaska Natives are aware that there is a limited amount of trained ICT professionals and that associated jobs are predominantly filled by non-tribal members. This situation impacts the ability of councils to rely on their tribal members for translation of complex ICT and telecom nomenclature into culturally appropriate examples prior to their ICT decision-making. Trained tribal technologists would more likely sustain institutional knowledge as they tend to live within their tribal lands, and to communicate and work in a relational⁵⁸ way.

Due to years of miscommunication, the Pacific Northwest Tribes distrust federal agencies. This distrust is a major obstacle in partnering to bridge the tribal digital divide. Distrust was evident when only seven of 29 Pacific Northwest Tribes sent a representative to the October 16, 2014 FirstNet⁵⁹ consultation meeting.

The low turnout for the FirstNet meeting did not go unnoticed: “Nevertheless we have 29 federal recognized tribes in the state – and some additional tribes beyond those – so we have more work to do to engage our tribes who are federal governments [sic]. Besides the Cowlitz, other tribes in the state cover a large geography and are economically and culturally important to our state. We have much more work to do to engage them all.”⁶⁰

⁵⁸ Relationality refers to, “Identity for indigenous people is grounded in the relationships with the land, their ancestors who have returned to the land and with future generations who will come into being on the land. Rather than viewing ourselves as being in relationship with other people or things, we are the relationships that we hold and are part of” (Wilson, p. 80).

⁵⁹ FirstNet is building the team that will create the first nationwide wireless broadband network dedicated to public safety. Retrieved from <http://www.firstnet.gov/> on March 5, 2016.

⁶⁰ FirstNet’s observation of low tribal representative turnout. Retrieved from <https://schrier.wordpress.com/2014/11/> on May 1, 2016.

Chapter 5 Discussion

American Indians and Alaska Natives (AIAN) clearly are among the information poor in America (Childers, 1975). US Government efforts to bridge the Information Communication Technology (ICT) digital divide⁶¹ have failed to appropriately address their specific and unique communication needs. The forced migration of American Indian and Alaska Native away from ancestral lands, resulting in geographic diaspora, damaged their connection to their traditional lands, airspace, plants and other dimensions of culture. This erosion of Indigenous Systems of Knowledge (ISK) directly impacts their participation in the Information Age.⁶² The combination of AIAN diaspora with the lack of recognition of sovereignty and self-determination, requires a distinct approach for bridging their digital divide.

As of 2016, AIAN tribes lack appropriate access to ICT and are impacted by the digital divide. For example, their unequal access to digital broadband and cellular signal hinders their participation in the Information Age and ability to benefit from critical community online services such as, Emergency Communications Networks (ECN), telehealth and online education.

The negative impacts of information poverty and the digital divide on AIAN Tribes was the motivation behind my research project. In this dissertation, I investigated the ICT decision-making processes of Puyallup Tribe of Indians and the Tulalip Tribes Tribal Councils. I studied their ICT decision-making processes prior to inception, deployment and propagation on their

⁶¹ Digital Divide generally refers to the disparity between people with access to digital connectivity with those that do not. For this research, I underscore the social digital divide that identifies the gap between the information rich and the information poor (Norris, 2001).

⁶² Information Age is generally defined as a shift to an economy based on information (Castells, 2011). The argument is that the Information Age shifted industrial revolution industries to an economy based on information. The advancement communication technologies created a digital society that divided the generations prior to 1969.

sovereign lands. The second level of investigation concentrated on the impacts of the councils' decisions on the lives of their community members.

The findings were obtained from interviews and analysis of ICT public documents. Puyallup and Tulalip interviewees offered information and suggestions that led me to additional conversations with non-Puyallup and non-Tulalip tribal members. Their comments provided supporting documentation. For example, an anonymous Quileute Tribal Council member described a situation in which a major telecom company installed fiber optic⁶³ lines (Figure 7) underneath the Quileute Reservation Lands in order to reach non-Quileute people's summer homes. The Quileute Council member expressed his frustration with the telecom company's unwillingness to offer fiber digital connectivity to the tribe even though the transmission lines travel directly underneath the reservation boundaries.

Documentation on Puyallup and Tulalip ICT and telecom decision-making, deployment and propagation was difficult to locate and analyze. This difficulty was complicated by the fact that Puyallup and Tulalip's sovereignty, right to self-determine, and privacy impact access to certain documentation. Fortunately, I was given access to documents that provided insight into AIAN leaders' information needs prior to their decision-making on ICT. For example, AIAN ICT and telecom experts from the Affiliated Tribes of Northwest Indians Conferences (ATNI) shared ICT documents they developed and sent to tribal councils and government agencies for action. The documents included summative analysis of Pacific Northwest Tribes (PNW) ICT

⁶³ Fiber Optic is a technology that uses glass (or plastic) threads (fibers) to transmit data. A fiber optic cable consists of a bundle of glass threads, each of which is capable of transmitting messages modulated onto light waves; see Figure 7. Retrieved from http://www.webopedia.com/TERM/F/fiber_optics.html on June 8, 2015.

concerns and digital connectivity needs. Pacific Northwest Tribal Councils' input and guidance was also included within the documents. Those documents were critical in ascertaining their decision-making processes on ICT.

I also reviewed descriptive statistics, social science of economics information, and ICT map infographics to supplement and elucidate the comparative case study findings. These areas assisted in data analysis by filtering key points from the interviews, observation data and document analysis. Data analysis divulged six common themes: sovereignty, economics, geography, information poverty, FCC, and tribal broadband fund.

The study involved an iterative data analysis process to assure that the common themes were reported within the context of my research questions. I learned that decisions concerning Information Communication Technologies and the digital divide do not automatically take into account tribal sovereignty. This was evident in the examples of ICT projects undertaken without consultation of Tribal Elders or councils. I learned that sovereignty, economics, geography, information poverty, FCC and tribal broadband fund do play a role when tribal leaders, as opposed to other agencies, make decisions on ICT.

The non-anonymous interviews were conducted at cafés to encourage social dialogue and a relaxed atmosphere. The Tulalip Tribes interviewees included Senator John McCoy, WA 38th District, Robin Kennedy, former Tulalip Business Analyst, and Travis Hill, Operations Manager Salish Networks. The Puyallup Tribe of Indians interviewees included council member David Bean and Dr. Danica Miller, University of Washington – Tacoma Professor. These initial

interviewees were critical for attaining an overall ICT landscape of the Puyallup and Tulalip Tribes. Due to his legislative experience, data from Senator McCoy were especially important. He also has training in the technology field and a deep desire to bridge the digital divide of Pacific Northwest Tribes.

The US Government often collapses tribal leadership structures into a single one-size-fits all category. Categorization of leadership structures provides the US with expedient “chiefdoms” for decision-making. However, the tribes have complex leadership structures that for example include Tribal Elder input. In addition, the number of council members differ from tribe to tribe. The Puyallup Tribe of Indians legislative body includes seven council members compared to 11 at the Pascua Yaqui Tribe. These distinctions and others should be addressed in research that concerns American Indian and Alaska Native decision-making and ICT. I believe this is a crucial step toward understanding Indian Country information needs for ICT decision-making.

5.1 Geography

The Puyallup Tribe of Indians and Tulalip Tribes share geolocation proximity with the two of the most populated cities in the Puget Sound; Seattle and Tacoma respectively. The tribes also have business relationships with industries that are located within city boundaries. Additionally, both tribes own successful casino and gaming ventures.

The tribes’ proximity to two of the most populated Puget Sound cities identifies them as urban tribes. Presumably, urban tribes should enjoy high levels of digital signal access. However, I found it difficult to connect using the T-Mobile Network at both tribal locations. My phone

signal would drop sporadically and was interrupted by signal noise, such as buzzing sounds or static electricity. My user level experience testified to the unequal distribution of signal connectivity even within urban tribal lands.

However, the Pacific Northwest Tribes are geographically diverse and are also present in remote areas within Washington State. Unfortunately, the US Government conflates the urban tribes with rural communities when developing projects focused on bridging the rural digital divide. This approach does not account for the specific travel distances and time investments needed for establishing cogent and culturally appropriate ICT programs within tribal sovereign lands.

The Puyallup and Tulalip Tribes proximity to cities facilitates their involvement in cutting edge ICT developments. Moreover, the tribes' proximity presents opportunities for direct relationships with city leadership to develop ICT that involves appropriate systems for tribal members. This partnering opportunity was not discussed in detail by the interviewees. However, they noted that such partnering had not been offered.

The geography of urban tribes is a suitable context for the Cities of Seattle and Tacoma to establish a co-creator⁶⁴ ICT model. Approaching the digital divide through a co-creation model respects tribal sovereignty and increases the ICT reach for both the cities and the tribes; thereby, increasing both of their economic footprints.

⁶⁴ See Glossary for co-creator definition.

Information regarding the economic status of the Puyallup and Tulalip Tribes is private and privileged; hence, during the interviews, tribal council members described, in broad terms, their current ICT investments. They were hesitant to discuss specific technologies, because they are aware of the complexity of the communication systems. For example, Senator John McCoy invited Salish Networks Operations Manager to our interview.

Puyallup Council member, David Bean, was clear that he would speak about decision-making rather than technology, but did offer a meeting with his IT Manager. Puyallup Tribal member, Danica Miller, commented several times that she did not know the definition of technical terms, but was willing to share her experience using cellular signal on the Puyallup Tribe of Indians lands. These findings illustrate the fact that tribal leaders and members are keenly aware of the limits of their ICT knowledge. Their hesitancy also highlights the need for tribal technology gatekeepers who are prepared to support their leaders when discussing ICT within and outside the reservation boundaries. The findings chapter provides examples of the tribal leaders' aspirations for assuring their members are properly trained to populate the high paying technology jobs offered by the tribes.

The need for federal government capital investment in ICT was emphasized by Senator John McCoy. He expanded his comment by describing the complex relationship the US Government has with Pacific Northwest Tribes' sovereignty. The senator was frustrated that the funding received by the tribes was contracted out to non-Natives to initiate ICT connectivity for PNW Tribes and said, "we don't see those dollars."

Tribal sovereignty has been a stumbling block for federal and local governments, because they tend to take action prior to asking tribes what or how they want to address ICT matters. Such conversations would require inclusion of ICT education and explanations of ICT policy so that tribal leaders would be prepared to consider the options. The economics of ICT has stymied the progressive changes to ICT infrastructure that are necessary for bridging the digital divide and thereby repudiating information poverty.

5.2 Trust

I am not a member of a Salish tribe. Before initiating this study, I had not interacted with tribal leaders from Puyallup and Tulalip Tribes. As a southwest Indigenous person, I correlated my oral traditions and semiotics with my limited understanding of their Indigenous Systems of Knowledge in order to start a conversation about their experiences with ICT. Establishing a common thread for conversation was critical for developing rapport for a long-term relationship outside of my dissertation. A sense of humor is critical when establishing rapport. Tribal leaders and members appreciated self-deprecating humor and my ability to joke about real world struggles such as poverty, physical appearance and other personal life issues. Humor helped to diffuse conversations when they concerned painful topics, such as loss of land and other historical trauma.

One of my dissertation findings includes the critical need for ICT researchers and technologists who are tribal members. I reduced my total original interviewee count from eight to six due to limited access to interviewees. The number of interviewees underscores the need for trusted American Indian and Alaska Native researchers who are aptly prepared to navigate the

trust issues associated with an outsider conducting research within their sovereign lands. Including AIAN researchers in research projects, addresses the question governmental and academic agencies pose when working in Indian Country: “How do we work with Indians?”

In order to facilitate the issues of trust in the research process, one approach is to train tribal members in research methods. Such training could teach tribal members how to conduct the work on their homelands and with their people. This endeavor would thereby encourage the inclusion of the tribes’ Indigenous Systems of Knowledge. The critical need for training tribal members as researchers, was evidenced by the current state of ICT at AIAN Tribes and their resulting underrepresentation in the Information Age. American Indians and Alaska Natives are at the nexus of being permanently left behind the Information Age if they continue to endure the digital divide.

Puyallup and Tulalip Councils have numerous issues they address during their legislative meetings, which include, voting on tribal membership, education and cultural persistence. Information and Communication Technologies is only a small subset of their critical needs and considerations. This was underscored by Tulalip Tribes Council Chairman Mel Sheldon Jr. when he commented, “How can I talk about telecom when I can’t even get my kids to finish high school?” This was also the case with Puyallup Participant 1 as he reflected on my question about cellular access. He stated, “We can make calls, but who is listening.”

Chairman Sheldon Jr.’s comment was representative of tribal peoples’ recognition of relationality, even when posed with a specific ICT question. In the case of Chairman Sheldon Jr.,

he related the critical need for education as a response to my research question concerning ICT and understood the connection. Chairman Sheldon's response accentuates the need for trusted AIAN Scholars to conduct this work, because they are more likely to see the relationship between educational disparity, the digital divide, and Indigenous Systems of Knowledge (ISK). Native scholars would be able to navigate ISK within their research projects and thereby create an environment of trust with tribal leaders and Elders.

Including trust in the academic preparation of AIAN researchers, challenges academia to a paradigm shift. For example, in the context of best practices, the inclusion of Puyallup and Tulalip Tribes' decision-making and leadership processes would provide an opportunity for considering tribal ways of communicating and solving problems.

Future ICT research at Puyallup and Tulalip Tribes' would benefit from focusing on those topics that tribal councils identify prior to developing a research project. For example, University of Washington, (Tacoma) Professor, Danica Miller (Puyallup) commented, "You are making me think about things I had not considered and I guess I need time to think about this." Her comment referred to the affordability of a telecom subscription study within her family. She was suggesting a potential research topic that was relevant to her experience. The integration of telecom subscription analysis could have provided a deeper conversation about how affordability interacts with family connectivity. In addition, telecom subscription discussions may have led to a richer and more substantial conversation about technology poverty. However, the sophistication of family dynamics, in combination with telecom subscription, would have led to new strands of inquiry outside the scope of this project.

5.3 Federal Communications Commission

5.3.1 Tribe-to-Tribe and Within Tribal Digital Division

The findings chapter discusses the interactions between Puyallup Tribe of Indians and Tulalip Tribes geolocations and access to ICT. Their geolocations strategically open opportunities for ICT development. Due to their ICT access, I identified them as “urban tribes” as opposed to “rural tribes.” Their urban designation includes expedient access to new mainstream ICT that includes Emergency Communication Networks, online education and numerous other digital communication resources positioned for capital investment. On the other hand, “rural” tribes are generally geographically isolated from major cities, main roads such as freeways, railways and consequently, digital technologies. As previously stated, Affiliate Tribes of Northwest Indians IT professionals refer to urban and rural tribal ICT access differences as the tribe-to-tribe digital division.

The tribe-to-tribe digital division has created added complexity for bridging that division. The unequal access to ICT between urban and rural tribes is exacerbated by joint federal and state government investments in ICT that disproportionately benefit urban tribes. The distribution of capital investment is partly a consequence of leveraging LCC’s existing ICT urban infrastructure. On the other hand, rural tribes have limited ICT infrastructure leverage opportunities, federal and state funds and access to technical experts. These deficits preclude them from developing their own technology resources, signal channels and information producing platforms. Rural tribal members are farther behind in the Information Age. The difference between urban and rural tribal ICT access was evident during my visitation to the urban Pacific Northwest Tribes. These tribes provide abundant digital service access, and in the

case of Tulalip, offer digital signal to their surrounding communities. The impact of disproportionate distribution of investments and expertise has rendered rural tribes as the information destitute. Their lack of basic access to Emergency Communication Networks (ECN), online education, telehealth and information resources has essentially put them out of sight and out of mind.

The Affiliate Tribes of Northwest Indians (ATNI) identified the tribe-to-tribe digital divide as a key phenomenon for the Salish Tribes. Salish Tribes have systematically stipulated that federal government has a fiduciary responsibility to establish a Tribal Broadband Fund (TBF) to ensure that they self-determine and own their broadband. However, the Federal Communications Commission (FCC) has not, to date, supported the Salish Tribes' ICT endeavors. The FCC contends that the digital spectrum is limited.

Yet, in 2015 the FCC auctioned off AWS-3⁶⁵ swath (Figure 8) of airwaves for a record-breaking \$44.8 billion. In 2008, the FCC raised \$19.1 billion by selling a set of spectrum used by TV broadcasters. The TV spectrum, bought by AT&T and Verizon, has been transformed to 4G Long Term Evolution (LTE) networks that serve as the standard for cellular phone connectivity.

FirstNet was incepted in 2012 with an approximate investment of \$7 billion from FCC's auction of the AWS-3 swath. The goal of FirstNet is to serve as a nationwide public safety network that connects through the 700MHz spectrum. FirstNet has eight leadership positions that define policy and actions for digital inclusion. However, none of the FirstNet leaders identify

⁶⁵ AWS-3 Sale. Retrieved from <https://www.cnet.com/news/fcc-rakes-in-45-billion-from-wireless-spectrum-auction/> on January 10, 2016.

tribal affiliation nor highlight the inclusion of tribes within their leadership model. FirstNet states, “FirstNet is creating an education and outreach program to engage tribal leaders on the network and their public safety needs. In addition to encouraging the designated single officer or governmental body to include tribal nations in the FirstNet state consultation process, FirstNet plans to hold additional meetings with tribal representatives (FirstNet, 2016).” The FCC’s creation of FirstNet does not appear to account for tribal sovereignty as four years have passed without the inclusion of tribal leaders within their decision-making structure. Tribal leadership non-inclusion in decision-making is a form of disrespect for their sovereignty.

American Indians and Alaska Natives’ efforts to self-determine ICT on their sovereign lands have had limited success. Puyallup and Tulalip Tribes have access to ICT; however, they are both at two distinct saturation points due to opportunity and investment. Tulalip is at the cutting edge of telecom, and are aware of the need for continued conversations on access and infrastructure investments. Puyallup is motivated to develop their own systems, but is stagnated by the numerous FCC regulations and the federal government’s lack of investment. The FCC digital signal profits have failed to appropriately bridge AIAN Tribes’ digital divide which contributes to information poverty. The FCC’s investment in FirstNet underscores the perception that tribes are an afterthought, because the FCC has the power to bequeath valuable airwaves to tribes so that they may develop their own ICT systems, but instead chose to create FirstNet.

5.4 Economics

5.4.1 Affordability

I define affordability as the perception and/or ability to purchase and/or use communication technologies based on financial situation and means.⁶⁶This definition applies to user level ICT purchasing power, access and ability to use.

Affordability was a predominant theme throughout the interviews, documentation analysis and ancillary conversations. Puyallup and Tulalip Council members and respective tribal members openly discussed their goals to save money while assuring appropriate connectivity at their respective geographic locations. They noted how cost savings highlighted by Large Capacity Carriers (LCC) Companies attracted them even though certain LCC Companies struggle to provide basic connectivity on tribal lands. This is partly due to LCC's minimal infrastructure investments and infrastructure sharing with other LCCs.

Affordability and ICT access divide the have and the have-nots. The consequence is an extension of information and digital signal poverty. The access difference increases ICT knowledge gaps and is noticeable when tribes interact with governmental and technical experts who use ICT systems nomenclature which is foreign to many tribal members. This was evident during my interactions and interviews with tribal council members and tribal members. For example, I noticed that most interviewees became silent and somewhat apprehensive whenever I used the words, "microwave," "point-to-point repeater" and "monopole."

⁶⁶ Affordability, believed to be within one's financial means. Retrieved from <http://www.dictionary.com/browse/affordability> on June 4, 2015.

5.4.2 Tribal Council ICT Decisions: Impact on Membership

Tribal members were generally unaware of ICT decisions made by their respective councils. However, their interview responses consistently identified affordability issues. For example, when asked if he was aware of recent or prior ICT decisions made by The Puyallup Council, Puyallup Participant 2 stated, “I use what I can (use cellular signal) so I don’t know what decisions are made.” Former Tulalip Business Analyst Robin Kennedy stated, “people didn’t have anything (telecom) so I had to do a lot of educating in the community. I don’t know their situations, but I think it was expensive.” Affordability comments were consistently made throughout the interview process.

Puyallup and Tulalip Tribe Council members did not discuss their ICT situations by using technological terminology, as they were not conversant with that terminology. The Affiliated Tribes of Northwest Indians IT professionals’ insights were vital to understanding the current state of ICT at Puyallup and Tulalip. They provided real world examples and experiences of working with ICT infrastructure. Specifically, IT professionals identified the need for ICT and telecom gatekeepers. This group emphasized that tribal councils are exceedingly aware of their need for ICT and their dependence on government agencies and non-Native organizations to advocate on their behalf. In addition, the tribes voiced their desire to ensure that AIAN gatekeepers be employed to translate the tribes’ technology and policy needs. Quinault IT Professional, Randell Harris stated, “Councils do know what they don’t know, but have the wisdom and insight on their specific members’ needs. We need more people to know their ways and provide the tech support for their tribes. We are consistently changing and it is difficult just

to stay current. It is difficult to be the only one...that is why we are working together here (ATNI Winter 2016 Conference).”

Tribal leaders require expedient access to technical experts and ICT business advocates who can elucidate information policies that include technical considerations. Tribal leaders would benefit from having conversations with AIAN technologists who understand the tribe’s information needs from a cultural perspective. The economic dimensions of ICT are complex and include the federal government. The inclusion of tribal leaders’ knowledge of the full range of tribal economics, increase the probability of bridging AIAN digital divide. In addition, a partnership model, between the tribes and the federal government would greatly assist in closing the digital divide. The digital divide will continue to permeate Indian Country without tribal representation during the ICT design phase and throughout the construction and implementation phases. Such representation should include an increase in the ICT knowledge base of the tribal membership.

6. Sovereignty: Need for Culturally Appropriate Systems and Experts

The Pacific Northwest Tribes have limited access to ICT expertise. The gap is partially addressed by the federal government, Large Capacity Carrier (LCC) Companies and trusted IT professionals. The experts attempt to translate complex ICT and telecom nomenclature for tribal decision-making. Like other tribes, the Puyallup and Tulalip Tribes seek technical expertise by necessity, largely outside their tribes in order to make informed decisions on ICT.

The Tulalip Tribes are a model of tribal ICT success largely because Senator John McCoy, WA 38th District, a Tulalip Tribal member, had the foresight to develop digital broadband and telecom programs in partnership with higher education academics. His membership in the community, respect for its ways and advocacy for proper technological advancement led to the inception of a Tulalip data center and the establishment of the Salish Networks Company to provide digital signal and technical services for the tribe.

Tribal council members from both tribes included in this study, are aware of the need for ICT and telecom gatekeepers. However, there is a limited amount of AIAN members who are pursuing Science, Technology, Engineering or Math degrees (STEM) to fill that critical talent gap. Training and employing AIAN technical experts is critical due to the fact that non tribal member technical experts working on reservations often lack cultural awareness.

Employing non-AIAN members for tribal ICT needs may expose the tribes' private information to mainstream society. Exposure of tribal data can have long-term impacts, such as misrepresentation of their economies including casino revenues. For example, Puyallup and Tulalip are casino gaming tribes and serve as employers for their surrounding communities. Their employer status is an important component for their geographic area's economic progress and development. However, Puyallup and Tulalip are sovereign entities with privacy considerations that may impact employment practices and other economic situations.

Sovereignty may be impacted by a lack of appropriate content management systems for collecting and archiving tribal information. Tribal ICT projects are typically conducted in

partnership with non-AIAN companies and government agencies. Those partnerships by definition, often result in access to tribal information that is private and should be protected. Non-AIAN profit seeking companies can expose tribal Intellectual Property (IP) inadvertently or on purpose. Tribal sovereignty precludes unauthorized organizations to accrue and appropriate their IP. This is the also the case for ICT companies that disallow replication of their IP or agree to financial compensation for use of their IP or reconfigured versions.

Land easements for LCCs to access ICT infrastructure also impacts tribal sovereignty. The fact that tribes do not own their ICT infrastructure forces them into land easements or to risk not having access to digital signal. For example, a T-Mobile point-to-point repeater at Puyallup or Tulalip Tribes remains the company's property. However, tribal easement authorizations are compensated with LCC cost reductions for digital connectivity subscriptions. If either Puyallup or Tulalip were to replicate T-Mobile's infrastructure configurations, the tribe would be liable for IP infractions and would have to pay royalty and other fines or be sanctioned.

American Indian and Alaska Natives' lack of appropriate ICT connectivity produces a market disadvantage that interferes with their sovereign right to self-determine their communities' way of life. Without dedicated digital signal, tribes are essentially dependent on LCCs and the government for digital signal. American Indians and Alaska Natives' procurement of digital signal for their tribal lands could introduce or increase online education opportunities that may include critical STEM degrees. Online education could facilitate the development of a cadre of technology experts prepared to deploy and serve as tribal technical gatekeepers⁶⁷ and

⁶⁷ Metoyer-Duran, Cheryl. (1993). *Gatekeepers in Ethnolinguistic Communities*. Norwood, N.J: Ablex Pub. Corp.

ICT knowledge experts. Tribal procurement of digital signal would also provide them with a vehicle for further developing economic opportunities within the tribe. For example, Salish art could be included in the design process of websites and taxonomic navigation. An online presence may also facilitate digital systems for selling and exchanging appropriate cultural items. Tribal ownership of digital signal could also encourage joint business opportunities with mainstream companies. For example, the Puyallup Tribe and SSA Marine have jointly developed of a 180-acre container terminal at the Port of Tacoma that serves the influx of ship container traffic on the West Coast.

Sovereign ownership of digital signal may also provide telehealth opportunities to improve AIAN health through awareness, education and online consultations with medical professionals. For example, health experts remotely diagnose ailments and provide treatment options through private networks via videoconference or other digital platforms. Online remote robotic surgery is also made possible through digital signal ownership. These services are critical for AIAN help to mitigate their infant mortality rate and diabetes. The US Department of Health and Human Services Office of Minority Health reports the disparate AIAN infant mortality as follows:

“a. American Indian/Alaska Natives have 1.5 times the infant mortality rate as non-Hispanic whites.

a. American Indian/Alaska Native babies are twice as likely as non-Hispanic white babies to die from sudden infant death syndrome (SIDS).

b. American Indian/Alaska Native infants are 70 percent more likely as non-Hispanic white

infants to die from accidental deaths before the age of one year.”⁶⁸

Tribally owned digital connections allows tribal members opportunities to obtain education online without compromising their sovereign right to privacy. Privacy is of particular importance to AIAN and was a key point made by interviewees throughout this study. College age tribal members displayed concern that their culture could be appropriated online. However, they were open to learning wisdom from their Elders in digital platforms, such as social media and e-mail. On the other hand, Tribal Elders voiced their concern that oral traditions are being lost due to the inappropriate uploading of their stories to digital platforms.

Tribal Elder contributions to our contemporary society have not been adequately recognized in elementary and secondary schools’ curricula. Many AIAN students are unaware of their ancestors’ critical contributions to the formation of the U.S. For example, the Iroquoian concepts of democracy are rarely discussed.⁶⁹ Iroquois inhabited the continent prior to its “discovery by Columbus” and subsequent renaming of it to “America.” The Iroquois contributions to democracy and their importance to our society is now more accessible because of digital signal access. In addition, tribal ownership of digital signal would encourage students to have private conversations with Elders who could securely instruct them in the ways of their ancestors.

⁶⁸ US DHHS-OMH. Retrieved from <http://minorityhealth.hhs.gov/omh/browse.aspx?lvl=3&lvlid=62> on June 5, 2016.

⁶⁹ Weatherford, J., *Indian Givers: How the Indians of the Americas Transformed the World*. New York: Fawcett Columbine, 1988. See especially, Chapter 8.

American Indians and Alaska Natives' sovereignty and specifically Puyallup and Tulalip's, is adversely impacted by limited by their technology poverty and dependence on the federal government. Digital systems and digital information allows for digital literacy that may overcome information poverty and thereby bridge the digital divide. Tribal members often experience digital illiteracy when they attempt to use advanced technology. They experience digital poverty in a real way for example, when they are required to drive over 10 miles to connect wirelessly to participate in online meetings. Of additional concern is the lack of appropriate access to Emergency Communication Networks, which are essential for reducing the loss of life and property.

As a result of my research, I believe and agree that the most expedient and respectful solution for the tribal digital divide is to establish a Tribal Broadband Fund and recognize AIAN as owners of their airspace, it is time for a new ICT paradigm. The AIAN have endured genocide, forced boarding schooling and the loss of ancestral lands. The FCC has a fiduciary responsibility to recognize AIAN sovereignty in the realm of ICT. In partnership with the tribes, the FCC could develop a model for ICT that would break the cycle of the digital divide in Indian Country.

Chapter 6 Conclusion

American Indian and Alaska Native (AIAN) decision-making concerning Information Communication Technology implementation and propagation has received attention from researchers. Literature on ICT decision-making is not only limited but what exists lacks rigor. Journal articles and books typically conflate AIAN decision-making with rural ICT initiatives. The complexity of the diaspora and geographic diversity of tribal lands require an in-depth research agenda in order to examine that the challenges tribal leaders navigate when making decisions on ICT. The FCC's inception of the Office of Native Affairs and Policy (ONAP) is a good first step to ensure AIAN representation. However, the tribes lack the capital investment and technologist talent pool necessary to bridge the digital divide and thereby address AIAN information poverty.

My dissertation aimed to understand the ICT decision-making of the Puyallup Tribe of Indians and Tulalip Tribes' Councils. The second level of inquiry involved identifying the perceptions of their decisions on their tribal members. My dissertation contributes to the small body of literature concerning AIAN decision-making on ICT. My findings underline the critical need for an ICT landscape study of Indian Country.

My specific research questions were as follows:

1: How do tribal council members decide to implement ICT and telecom in Indian Country?

1.1 What were the considerations tribal council members reflected on prior to implementation?

2: What are the impacts of those decisions on their tribal membership?

2.1 What do tribal members think about their telecom access?

Thomas Childers' 1975⁷⁰ work on information poverty was fundamental to this research, because he introduced the concept of information poverty. He discussed American Indian and Alaska Native communication issues and related them to isolation and geographic remoteness. Childers also described the way AIAN distrust of mainstream society further distanced them from accessing communication links that are necessary for their wellbeing.

Technology poverty correlates with information poverty for the Pacific Northwest Tribes. Technology infrastructure provides benchmarks for measuring access, much like utility poles identify access to electricity. The visible ICT infrastructure is unequal to that of the surrounding towns and cities. The digital divide coupled with technology poverty can be responsible for life threatening events. For example, tribal members could lose their homes due to fire if they cannot access appropriate technology. The lack of ICT infrastructure is responsible for the disproportionate amount of AIAN members who die, because they lack access to Emergency Communication Networks.

The Federal Communications Commission's (FCC) mission includes assurance of signal connectivity for all US Residents. Yet, they struggle to bridge the digital divide in Indian Country. The FCC's creation of the Office of Native American Affairs and Policy (ONAP) in 2010 was the initial step in bridging the digital divide in Indian Country. However, the FCC

⁷⁰ Childers, Thomas, & Post, Joyce A. (1975). *The Information Poor in America*. Scarecrow Press, P.O. Box 656, Metuchen, New Jersey 08840.

lacks an understanding of American Indian and Alaska Native (AIAN) decision-making processes. Consequently, communication discourse hinders AIAN's participation in the Information Age and further expands the digital divide gap.

The lack of recognition of tribal sovereignty is at the heart of the digital divide in Indian Country. The conditions in which the AIAN tribes live are not reflective of their ancestral ways. Their loss of lands, in particular, has impacted their sovereignty and self-determination. The erosion of sovereignty is one consequence of the fractured relationship with the federal government. The federal government has initiated punitive policies which have overturned tribal council decisions. The broken relationship is evident in the FCC's inability to assure equal representation of AIAN Tribes in the Information Age.

The Pacific Northwest Tribes are far behind the mainstream population in the adoption and propagation of Information Communication Technologies. This is clear from my dissertation. The repercussions of AIAN's unequal access to ICT directly impacts their wellbeing and is a form of digital signal genocide.

The Information Communication Technologies (ICT) digital divide has created two Americas: the have and the have-nots. Indian Country is among the have-nots. The federal government's fiduciary responsibility to AIAN requires immediate attention to their ICT needs. The government's financial investments and provision of infrastructure and subject matter expertise are mechanisms for bridging the divide. More importantly, it is necessary that a co-creator model be established between AIAN and the FCC to ensure that tribal sovereignty is

recognized and honored. The development of a co-creator model provides a context for tribal led ICT design, implementation and proliferation on their sovereign lands. Moreover, the co-creator model facilitates integration of ancestral knowledge within the ICT systems, resulting in respectful signal communication services for their members.

Senator John McCoy, Tulalip member and 38th District WA Senator, stated, “We are just one step above smoke signals,” when asked about his experiences with ICT in Indian Country. His statement served as the powerful mantra for this research, because it succinctly describes the ICT situation in Indian Country and specifically in the Washington State Tribes.

Respect for American Indian and Alaska Natives’ sovereignty and the co-creation of ICT are powerful and respectful ways to begin bridging the digital divide. The tribal history of land extinguishment and cultural appropriation have negatively impacted American Indian and Alaska Natives’ ability to flourish. It is now time for the federal government to honor their promises.

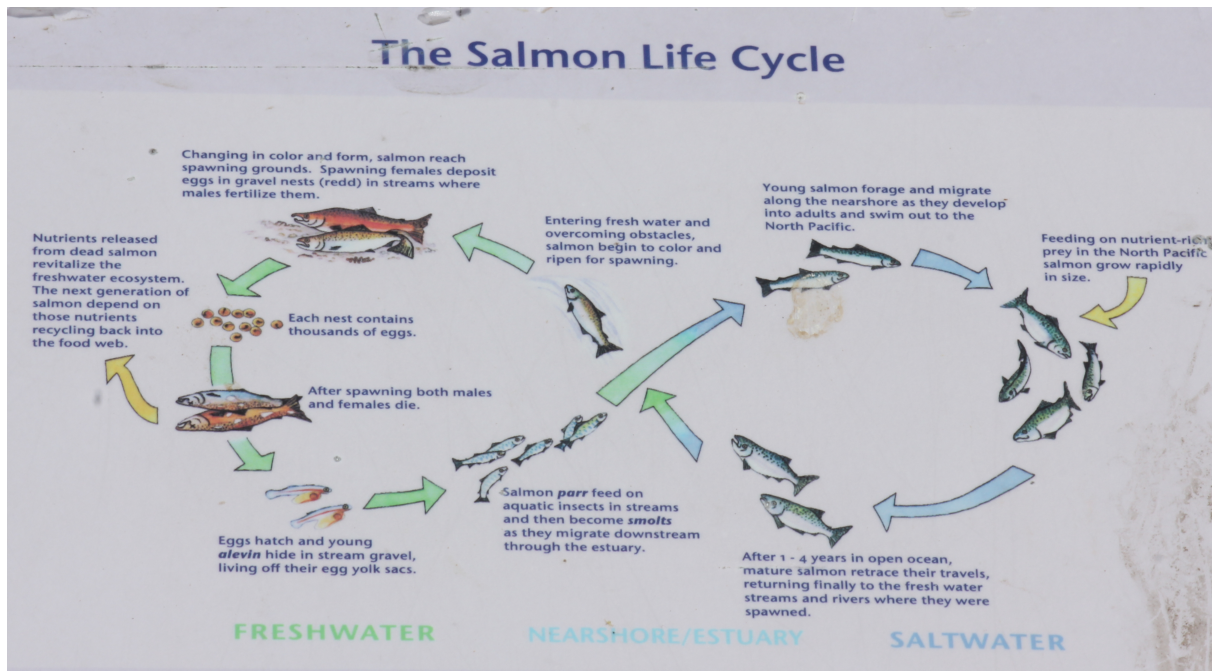
This dissertation project contributes to the existing body of literature, concerning the ICT tribal decision-making process. It underscored the need for future research that encompasses economics, employment, sovereignty, legislation and the integration of an AIAN decision-making culturally iterative spiral model.⁷¹ The salmon lifecycle and the ICT software development life cycle (SDLC)⁷² may serve as an example. The salmon lifecycle is integral to

⁷¹ My argument is that a culturally iterative spiral model is not is not similar to the growth business model or the software spiral model. I posit that the spiral decision-making model requires an iterative process through a spiral. Hence, concepts travel through a spiral path where nuance is integrated in ideation that intersects with Indigenous Systems of Knowledge for decision-making.

⁷² Software Development Life cycle (SDLC). Retrieved from https://www.tutorialspoint.com/sdlc/sdlc_spiral_model.htm on January 3, 2016.

Coast Salish and Salishian Language Tribes' understanding of water. The tribes conduct canoe journeys to honor their ancestral relationship with fish. The SDLC serves as a model for deploying software to the market.

In conclusion and with respect, I offer for consideration the salmon cycle for ICT decision-making at Pacific Northwest Tribes:



The salmon lifecycle starts with salmon *eggs*. In Information Communication Technologies this represents ideas.

Eggs hatch into *alevin* and hide in stream gravel, like to as ideas fomenting and living within tribal councils' governance agendas.

In the next phase, Salmon *parr* feed until they become *smolts* as they migrate downstream. This part of the Salmon cycle represents tribal councils' information gathering as they consider new ICT.

Smolts mature to *young salmon* that feed on northwest nutrients nearshore until they reach 1-4 years old and travel to the North Pacific Ocean. In ICT, this part of the lifecycle represents the development of decisions and the schedule for deploying ICT on tribal lands.

Female Salmon that enter the open ocean, change color and form as they spawn and deposit their eggs in gravel nests for male salmon to fertilize. In parallel to ICT decision-making, I pose that this part of the cycle represents the sun-setting⁷³ of specific ICT, such as telecom, and seeding of new ICT.

Upon spawning, salmon males and females roam the ocean until expiration then release their nutrients back to the waters to support the new salmon cycle. I correlate this to ICT sunsets and the mothballing of infrastructure until it is recycled to develop new infrastructure, such as new cellular tower monopoles and other communications infrastructure hardware. The new infrastructure configuration is more aptly prepared for the integration of the next generation of Information Communication Technologies.

The salmon lifecycle happens in perpetuity until disrupted by external forces that cannot be controlled. However, the ICT lifecycle cannot happen in a vacuum and requires federal government partnership. Respect of American Indian and Alaska Natives' sovereignty may be exhibited by the US acknowledgement of tribal ownership of their tribal land airspace. Tribal ownership coupled with the establishment of a Tribal Broadband Fund assures that tribal Information Communication Technologies are equivalent to that of mainstream America. Tribal isolation and alienation must end. It is time for a Tribal Broadband Fund and the ownership and protection of tribal airspace.

⁷³ Sun setting is intentionally phasing something out or terminating it. Retrieved from <http://whatis.techtarget.com/definition/sunseting> on October 5, 2016.

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Figure 1: Tulalip Broadband Map as of 4.26.15

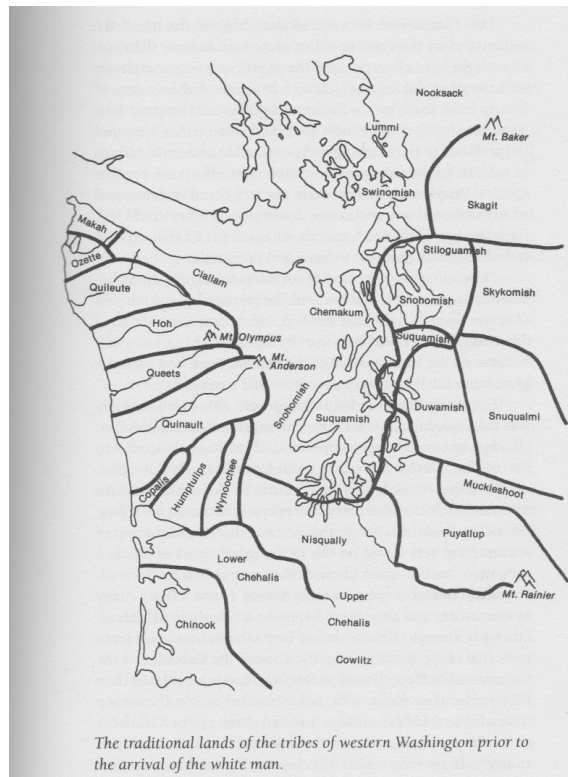


Figure 2: Map of Western Washington Lands prior to colonization; (Deloria, 2012, p. 7)

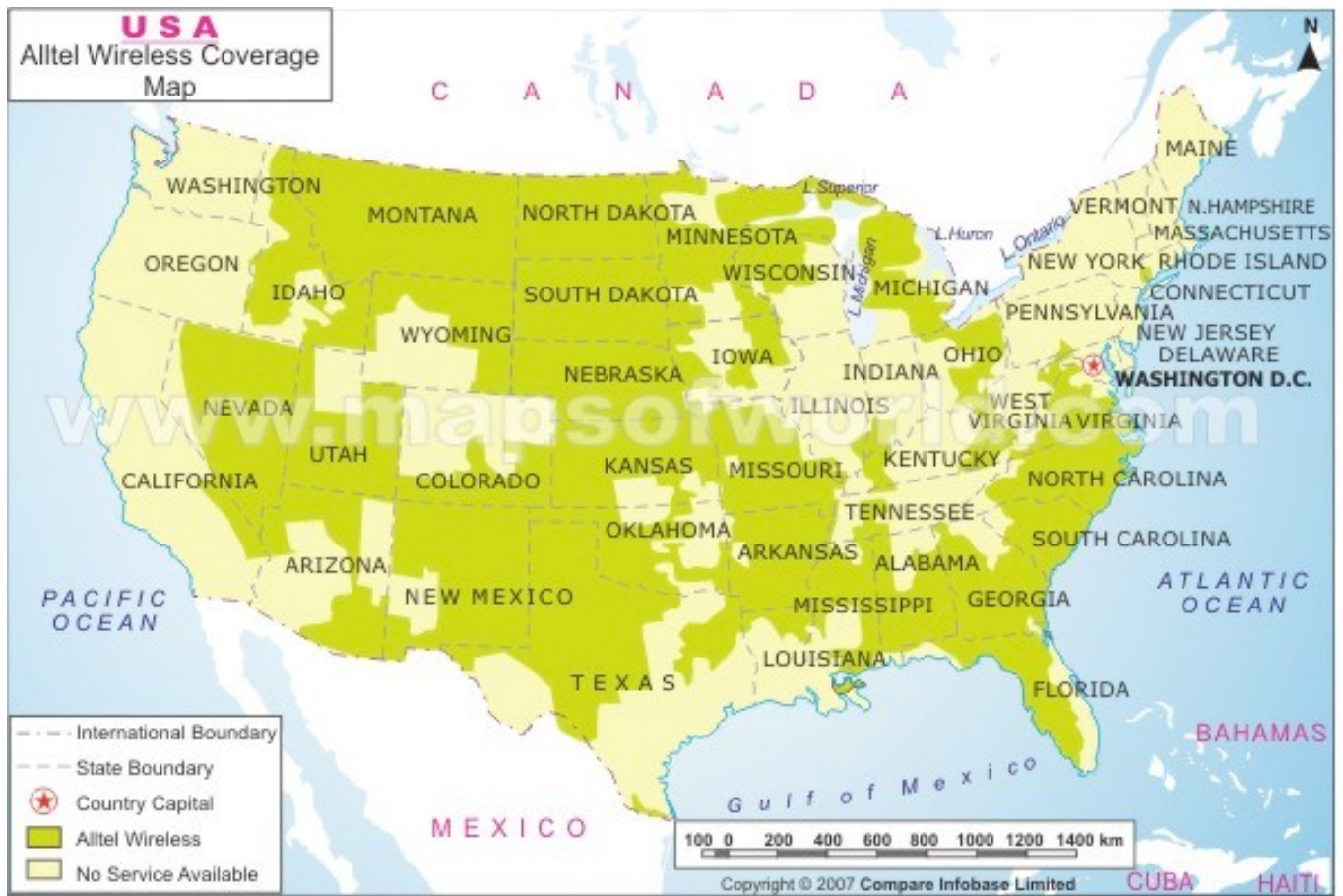
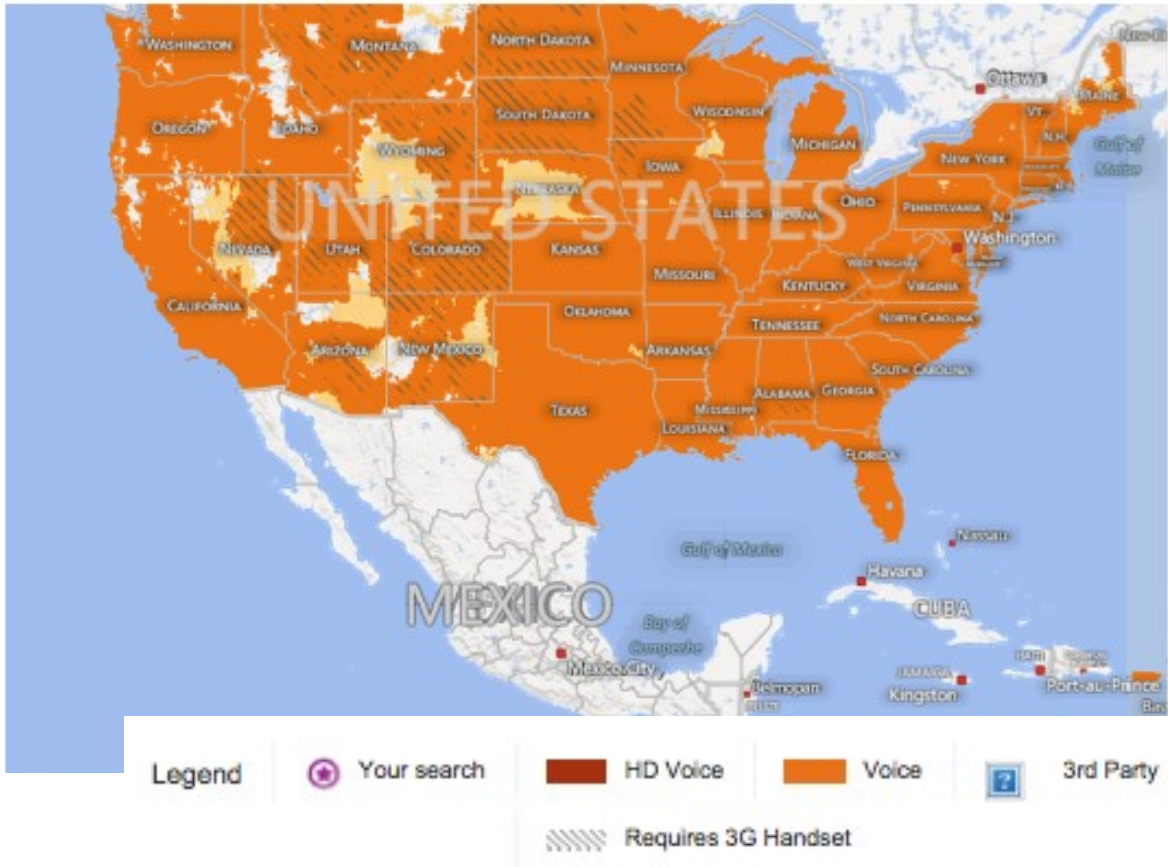


Figure 3: Alltel Telecom Coverage Map as of 4.25.15

Coverage by Device Type: Voice

Domestic Wireless Voice Coverage

This map shows wireless voice coverage in the United States, Puerto Rico and the U.S. Virgin Islands.



*Figure 4: ATT Coverage
Map as of 4.25.15*

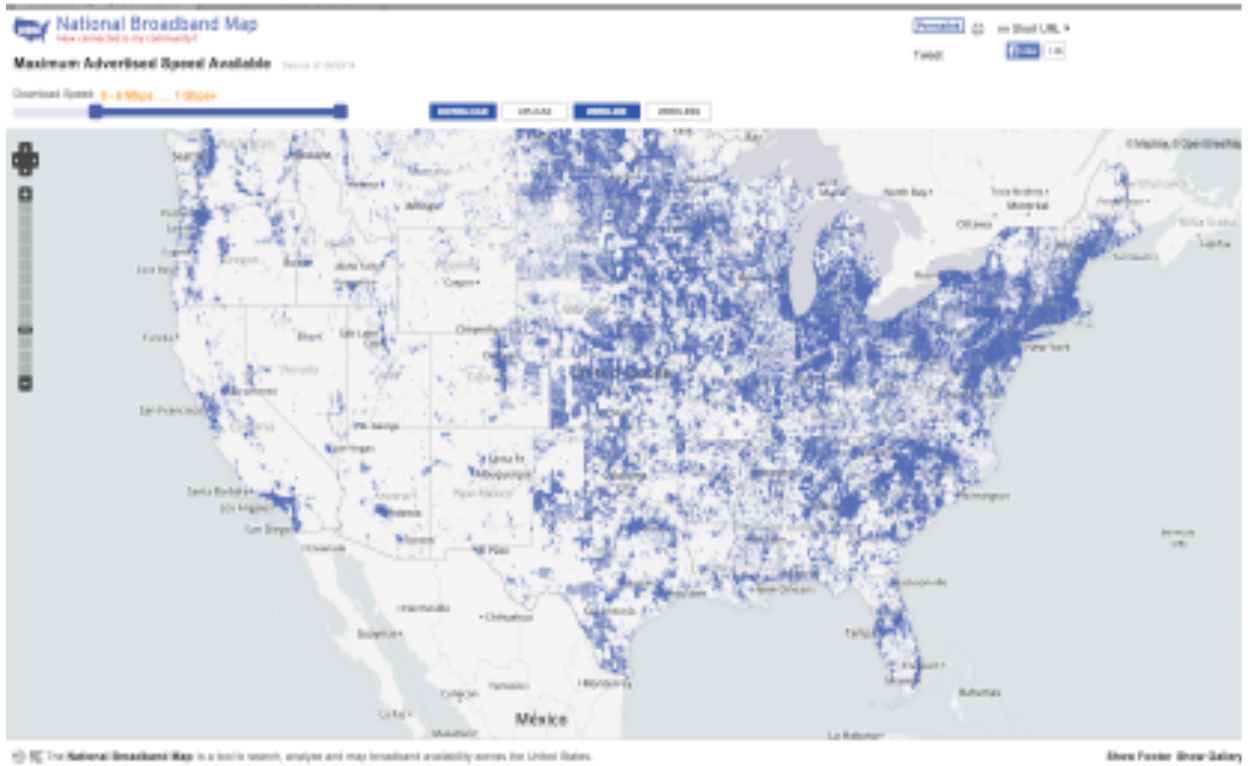


Figure 5: National Broadband Map as of 4.25.15

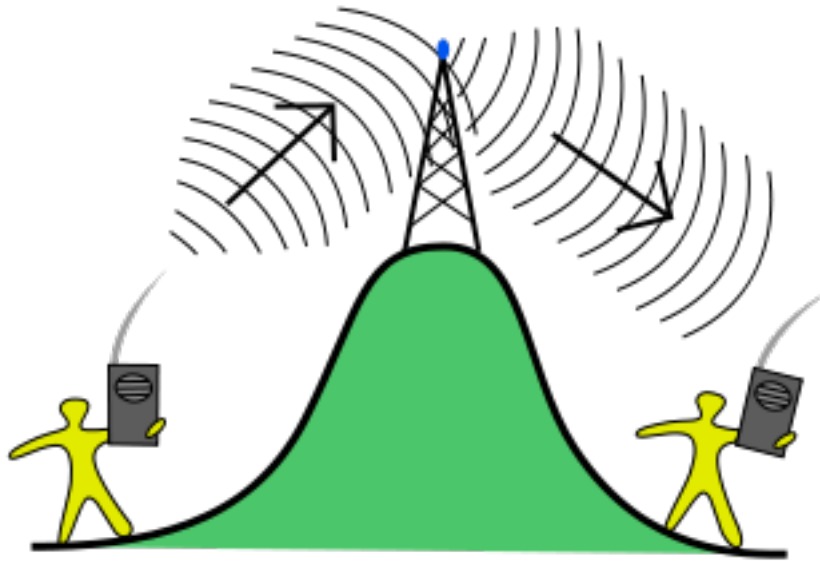


Figure 6: Point to point repeater

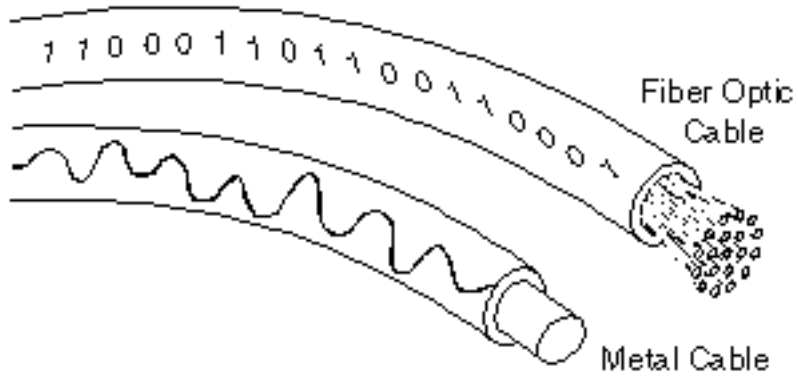


Figure 7: Fiber Optic

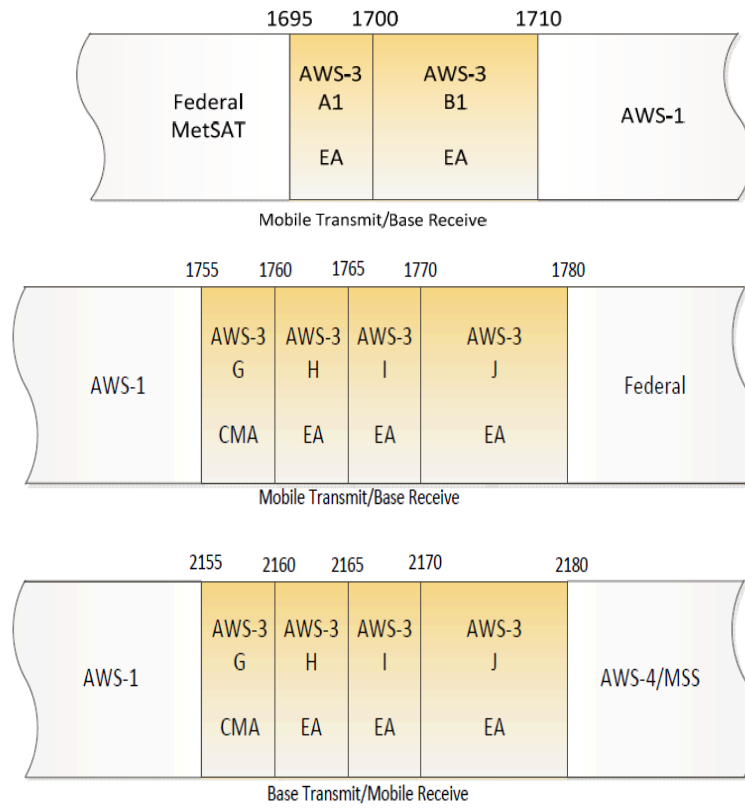


Figure 8: AWS-3 Bands

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Table 4: Percent of U.S. Households with a Telephone			
By Race/Origin			
By Rural, Urban, and Central City			
Rural	Urban	Central City	
White-non-Hispanic	95.4	96.2	95.2
Black-non-Hispanic	80.9	86.3	86.2
Hispanic	79	86.4	84.9
American Indian, Aleut, Eskimo-non-Hispanic	75.5	90	90.3
Asian or Pacific Islander-non-Hispanic	97.1	95.8	95.3
Other-non-Hispanic	81.8	91	88.3

Table 1: 1995 NTIA Report

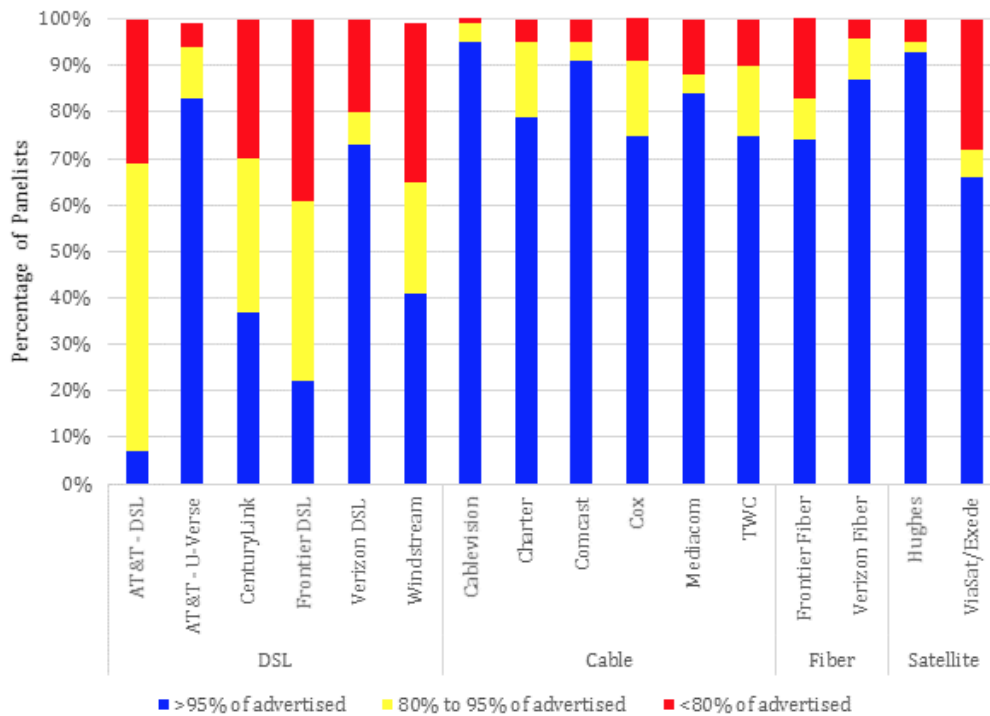


Table 2: FCC Actual Speed Measurement Variation by Location and Day

BIBLIOGRAPHY

Affiliated Tribes of Northwest Indians. About the ATNI Energy Program (2015, June 9). Retrieved from <http://www.atnitrines.org/atni-energy-program>

Affiliated Tribes of Northwest Indians. Ways to Further Expand and Promote Broadband Deployment, Adoption and Competition (2015, December 12). Retrieved from http://www.ntia.doc.gov/files/ntia/affiliated_tribes_of_northwest_indians_telecommunications_committee_boc.pdf

Archibald, J. (2008). *Indigenous storywork: Educating the heart, mind, body, and spirit*. Vancouver: UBC Press.

Barzilai-Nahone, K. (2009) "Gatekeeping: A Critical Review," *Annual Review of Information Science and Technology* 43, 1: 1-79.

Bee, R. (1982). *The politics of American Indian policy*. Cambridge, Mass.: Schenkman Publisher.

Belarde-Lewis, Miranda. (2011) "Sharing the Private in Public: Indigenous Cultural Property in Online Media," Proceedings of the 2011 iConference. Seattle, Washington.

Boldt Decision. (1975). *United States v. Washington*, 384 F. Supp. 312 (W.D. Wash. 1974), *aff'd*, 520 F.2d 676 (9th Cir. 1975).

Black, H.C (1990). *Black's Law Dictionary*, Sixth Edition. St. Paul, Minnesota. West Publishing CO.

Boxleitner, K. (2015, Nov 10). Tulalips discuss obstacles to obtaining broadband. Retrieved from <http://www.arlingtontimes.com/news/344169312.html>

Bureau of Indian Affairs. FAQs (2016, July 5). Retrieved from <https://www.bia.gov/WhoWeAre/BIA/EEO/FAQ/index.htm>

Castells, M. (2011). *The Rise of the Network Society: The Information Age: Economy, Society, and Culture*, Volume 1. Blackwell Publishing Ltd (2e, 2000).

Champagne, D. (2013). How U.S. Allotment Policy Devastated Native Lands. Retrieved from <http://indiancountrytodaymedianetwork.com/2013/11/18/government-engineered-allotment-policy-devastating-indians-152224>

Chapin, M., et al (2005) "Mapping Indigenous Lands," *Annual Review of Anthropology* 34: 619-638.

Cheyenne River Sioux Tribe Telephone Authority. About Us. (2015). Retrieved from <http://crsta.com/about/about-us.php>

Childers, T. (1975). *Information Poor in America*. Metuchen, NJ: The Scarecrow Press, Inc.

Connect America Fund, WC Docket No. 10-90, ETC Annual Reports and Certifications, WC Docket No. 14-58. Retrieved from https://apps.fcc.gov/edocs_public/attachmatch/FCC-14-98A2.docx

Dawes Act, or General Allotment Act of 1887, 25 § 331. Retrieved from <https://www.ourdocuments.gov/doc.php?flash=true&doc=50>

Deloria, V. Jr. (1994) *God Is Red: A Native View of Religion*, Golden, Colorado. North American Press.

Deloria, V. Jr. (1997) *Indians of the Pacific Northwest*. Golden, CO. Fulcrum Publishing.

Digital Capitalism: Networking the Global Market System. Massachusetts Publishing Company.

Dingwall, C. (1995). *Hein Online*, 48 Fed. Comm. L.J. 105 (1995-1996). *The Last Mile: A Race for Local Telecommunications Competition Policy*. Retrieved from <http://heinonline.org/HOL/LandingPage?handle=hein.journals/fedcom48&div=12&id=&page=>

Duarte, M., Metoyer, Cheryl A., Fidel, Raya, Garcia, Maria Elena, Levy, David, & Moore, Adam. (2013). *Network Sovereignty: Understanding the Implications of Tribal Broadband Networks*, ProQuest Dissertations and Theses.

Executive Order 13175. (2000). *Consultation and Coordination with Indian Tribal Governments*. *Federal Register*, Volume 65, Number 218, pages 67249-67252. Washington, DC. Retrieved from <http://www.state.gov/documents/organization/136740.pdf>

Federal Communications Commission. *Expanding Telecommunications Access in Indian Country* (2006, July). Retrieved from <https://transition.fcc.gov/indians/itibooklet.pdf>

Federal Communications Commission Notice of Proposed Rulemaking. *Improving Communications Services for Native Nations by Promoting Greater Utilization of Spectrum over Tribal Lands* (2011). Retrieved from <https://www.fcc.gov/document/improving-communications-services-native-nations-promoting-greater-utilization-spectrum-ove>

Federal Communications Commission. *Trends in Telephone Service. Industry Analysis and Technology Division Wireline Competition Bureau* (2010). Retrieved from www.fcc.gov/wcb/iatd/trends.html

Federal Communications Commission Puyallup Tribes broadband map. (2014, June 30). Retrieved from <http://www.broadbandmap.gov/summarize/native-nations/puyallup>

Federal Communications Commission FCC 10-141. Establishment of the Office of Native Affairs and Policy in the Consumer and Governmental Affairs Bureau (2010, August 12). Retrieved from https://apps.fcc.gov/edocs_public/attachmatch/FCC-10-141A1.pdf

Federal Communications Commission FCC 00-207. (2000, June). Retrieved from URL <http://www.fcc.gov/native><http://www.fcc.gov/native>

Federal Register. Indian Entities Recognized and Eligible to Receive Services from the Bureau of Indian Affairs (2012, August). Retrieved from <https://www.federalregister.gov/documents/2012/08/10/2012-19588/indian-entities-recognized-and-eligible-to-receive-services-from-the-bureau-of-indian-affairs#p-208>

Field, T. (2001) "Homegrown Talent: One Sioux Reservation is Investing Its Future in an IT Services Venture Called Lakota Technologies, Inc.," *CIO Magazine*, 1 October 2001. Retrieved from http://www.cio.com/article/30568/Lakota_Technologies_and_American_Indian_IT_Outsourcing

Fleming, S. T. (2003). The leapfrog effect: information needs for developing nations. In S. T. Fleming, *Managing globally with information technology* (pp. 127- 139). Hershey: Idea Group Publishing.

Friends Committee on National Legislation prepared by Powers, P.R. (2006). *Native Americans and The Public a Human Values Perspective*. Retrieved from http://fcnل.org/assets/na_mediasymp_report.pdf

Gershon, R. (2009). *Telecommunications and business strategy*. New York, New York. Routledge/Taylor and Francis Group.

Gordon, A., et al. (2001). Native American Technology Access: The Gates Foundation in Four Corners. *Electronic Library* 21, 5: 428-434.

Governor's Office of Indian Affairs. (2015). Retrieved from <http://www.goia.wa.gov/treaties/treaties.htm>

Handbook for Consultation with Federally Recognized Indian Tribes. (2011, December). Retrieved from <https://www.census.gov/aian/pdf/HandbookforConsultationwithFRITribes.pdf>

Hodge, Maliski, Cadogan, Itty, and Cardoza (2011) Learning How to Ask: Reflections on Engaging American Indian Research Participants. *Journal American Indian Culture and Research Journal*, Volume 34 (4/2010), pp 77-90. Retrieved from <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3302686/>

Holm, T., et al. (2003) "Peoplehood: A Model for the Extension of Sovereignty in American Indian Studies," *Wicazo Sa Review* 18, 1: 7-24.

Huang, Chun Yao, (2011) Rethinking leapfrogging in the end-user telecom market. *Journal Technological Forecasting and Social Change, Volume 78, Issue 4, May 2011, Pages 703–712.*

Indian Self-Determination and Education Assistance Act of 1975 25 § 450. Indigenous Commission for Communications Technologies in the Americas. (2009) *The Plan: Indigenous Peoples Empowering Themselves Through Technology*. Ottawa: ICCTA. Retrieved from <http://www.bia.gov/cs/groups/mywcsp/documents/collection/idc017333.pdf>

ISDN Basic Rate Interface. (n.d.). February 7, 2014. Retrieved from <http://www.att.com/gen/general?pid=9628>

Lucky, R., Eisenberg, Jon, & National Research Council. Committee on Telecommunications Research Development. *Renewing U.S. telecommunications research*. Washington, D.C. (2006): National Academies Press.

Marine View Ventures. (2015). Retrieved from <http://www.marineviewventures.com/news.php?nid=14>

Mazzocchi, F. (2006). Western science and traditional knowledge: Despite their variations, different forms of knowledge can learn from each other. *EMBO Reports*, 7(5), 463–466. Retrieved from <http://doi.org/10.1038/sj.embor.7400693>

Melton, A. Judicature (1995). *Volume: 79, Issue: 3, November-December 1995*, pages: 126-133. Retrieved from <http://www.tribal-institute.org/articles/melton1.htm>

Metoyer-Duran, C. (1993). *Gatekeepers in Ethnolinguistic Communities*. Norwood, N.J. Ablex Pub. Corp

Metoyer-Duran, C. (1993). Information Gatekeepers, *Annual Review of Information Science and Technology* 28: 111-150.

Moore, G. (1970). Moore's Law or How Overall Processing Power for Computers will Double Every Two Years. Retrieved from <http://www.moorelaw.org>

Morris, T., Meinrath, S. *New Media, Technology, and Internet Use in Indian Country: Quantitative and Qualitative Analyses* (2009). Phoenix and Washington, D.C. Native Public Media and New America Foundation.

Native American Broadband Association. Native American Broadband Association (2010). <http://www.nativeamericanbroadband.org>

National Broadband Map (2015). Retrieved from <http://www.broadbandmap.gov/internet-service-providers/puyallup-tribe/lat=47.1325048/long=-123.3336825000001/>

National Congress of American Indians. (2015) White House Tribal Nations Conference, Washington, DC. Retrieved from http://www.ncai.org/conferences-events/ncai-events/2015_WHTNC_Briefing_Book_Final.pdf

National Telecommunications & Information Administration: Falling Through the Net: A Survey of the "Have Nots" in Rural and Urban America. (1995). Retrieved from <http://www.ntia.doc.gov/ntiahome/fallingthru.html>

National Academies of Sciences Engineering and Medicine. The Importance of Telecommunications and Telecommunications Research. Retrieved from <https://www.nap.edu/read/11711/chapter/3> on January 7, 2015.

Norris, P. (2011). Digital Divide: Civic Engagement, Information Poverty and the Internet Worldwide. New York, New York Cambridge University Press.

Office of the Federal Register. A Guide to Rulemaking Process. Retrieved from https://www.federalregister.gov/uploads/2011/01/the_rulemaking_process.pdf

Patton, M.Q., (2002) Qualitative Research & Evaluation Methods 3 Ed. Thousand Oaks, CA. Sage Publications.

Petersen D. (1995). Human Ecology and Climate Change: People and Resources in the Far North, chp 15, pp. 219.

Public Law 93-638. 1975. Indian Self-Determination and Education Assistance Act, as Amended Regulations Final Rule Department of the Interior Bureau of Indian Affairs Department of Health and Human Services Indian Health Service 25 CFR Part 900.

Puyallup Tribe of Indians About. (2015). Retrieved from <http://www.puyallup-tribe.com/about/>

Telecommunications Technology and Native Americans: Opportunities and Challenges report. (1995). Retrieved from <https://www.princeton.edu/~ota/disk1/1995/9542/9542.PDF>

The Boldt Decision. Hon. Boldt, G.H. (1974, February). Retrieved from <http://wdfw.wa.gov/fishing/salmon/BoldtDecision8.5x11layoutforweb.pdf>

the Chief Seattle Geek blog (2014). FirstNet comes to the "Other" Washington. Retrieved from <https://schrier.wordpress.com/2014/11/05/firstnet-comes-to-the-other-washington/>

The National Congress of American Indians Resolution #RAP-10-006 (2010). Retrieved from http://www.ncai.org/attachments/Resolution_XEsYONukRAWPfgYaURleGvCuoaGiMoDTpDyILYGAjnykJBHXGM_RAP-10-006.pdf

The National Congress of American Indians Resolution #ABQ-10-061 (2010). Retrieved from http://www.ncai.org/attachments/Resolution_JxntzMKXvEeZdOuAIXZTMGuxbkNlapYQvQDosjKVSmexsxkeDso_ABQ-10-061_rev_updated.pdf

The National Congress of American Indians Resolution #REN-13-064 (2013). Retrieved from http://www.ncai.org/attachments/Resolution_DIzgmRRZHqzraWoasGiGEVjIQOmvpeljBINMeuAUbJRsvogzYkB_REN-13-064%20final.pdf

Riley, L., et al. (1999) Assessment of Technology Infrastructure in Native Communities. Economic Development Administration, U.S. Department of Congress. Las Cruces: New Mexico State University.

Schiller, D. (1999). Digital Capitalism: Networking the Global Market System. Cambridge, Mass. MIT Press.

Senate Hearing 108-119. (2003, May 22). Retrieved from <http://www.gpo.gov/fdsys/pkg/CHRG-108shrg87495/html/CHRG-108shrg87495.htm>

Smith, L.T. (2012) Decolonizing Methodologies. London: Zed Books.

Stake, R. (1995). The Art of Case Study Research. Thousand Oaks, CA: Sage.

S.761 - Native American Telecommunications Improvement and Value Enhancement Act 107th Congress (2001-2002). Retrieved from <https://www.congress.gov/bill/107th-congress/senate-bill/761>

US Census Bureau (2001). Money Income in the United States 2001. Retrieved from <https://www.census.gov/prod/2002pubs/p60-218.pdf>

Telecommunications Act. (1996) Pub.L. 104, 110 Stat. 56.

Tulalip Tribes Broadband. (2015). Retrieved from <http://www.tulalipbroadband.com/customerservice/>

Tulalip Grants and Self-governance Office produced Tribal Labor Force Report. (2006). Retrieved from http://www.tulaliptribesnsn.gov/Portals/0/pdf/departments/community_development/Comprehensive-Land-Use-Plan/Reservation-Economy.pdf

Tribal Initiatives. (2013). Retrieved from <http://transition.fcc.gov/indians/>

U.S. Congress, Office of Technology Assessment, Telecommunications Technology and Native Americans: Opportunities and Challenges, OTA-ITC-621 (Washington, DC: U.S. Government Printing Office, August 1995).

US Fish and Wildlife Service Tribal Consultation Handbook. (2011). Retrieved from http://www.fws.gov/carlsbad/TribalRelations/Tribal_Consultation_Handbook_2013.pdf

US National Library of Medicine. (2015). Making a Powerful Connection: The Health of the Public and the National Information Infrastructure. Retrieved from <https://www.nlm.nih.gov/pubs/staffpubs/lo/makingpd.html>

Van Gigch, J., & McIntyre-Mills, Janet J. (2006). Wisdom, knowledge, and management: A critique and analysis of Churchman's systems approach (C. West Churchman and related works series; v. 2). New York: Spring.

Visualizing Economics: Adoption of New Technologies since 1900. (2008). Retrieved from <http://visualizingeconomics.com/blog/2008/02/18/adoption-of-new-technology-since-1900>

Vizenor, G. (1998). Fugitive poses: Native American Indian scenes of absence and presence (Abraham Lincoln lecture series). Lincoln, Neb., University of Nebraska Press.

Wireless Broadband Internet FAQ's. (n.d.). Retrieved <http://www.cblcon.com/wirelessisp/faq.htm>

Wilkins, D. (1997) American Indian Sovereignty and the U.S. Supreme Court. Austin: University of Texas Press.

Wilson, S. (2001) Research is Ceremony: Indigenous Research Methods. Fernwood Publishing.

GLOSSARY OF TERMS

1. American Indians and Alaska Natives (AIAN) refers to the original peoples of north, central and south America who maintain tribal affiliation or community attachment. The definition is available at <http://www.census.gov/history/pdf/c2010br-10.pdf> and was retrieved on June 2, 2016.
2. AWS-3 Bands. The AWS-3 bands are comprised of the following bands listed below and visible in Figure 8.
 - a. 1695-1710 MHz
 - b. 1755-1780 MHz
 - c. 2155-2180 MHzThe availability of the AWS-3 bands and consequent auction by the Federal Communications Commission (FCC) on November 2014, was an opportunity to establish a tribal owned and controlled cellular network. Tribal ownership of such band swaths would have provided opportunities for tribe led and owned research and development investments, intellectual property production and inclusion in the Information Age. However, the FCC sold the AWS-3 bands for \$44.9 billion (actual sale \$44,899,451,600) to Large Capacity Carriers AT&T and Verizon in January 2015. Retrieved from http://wireless.fcc.gov/auctions/default.htm?job=auction_factsheet&id=97 on January 3, 2015.
3. Co-creation model as understood in Native American communities is a leadership model in which the participants make their decisions in a collaborative framework that recognizes and respects tribal sovereignty, relationality, and other relevant aspects of Indigenous Knowledge. For a full discussion of American Indian leadership, see Metoyer, Chery A. "Leadership in American Indian Communities: Winter Lessons." *American Indian Culture and Research Journal*, 34:4,2010, pp. 1-
4. Digital divide is commonly referred to as the division between people and societies who have digital and technology access and those that do not. Information scientists, scholars, policy makers provide multiple definitions for the phenomenon. However, my research focuses on the access and ownership of digital signal and corresponding hardware.
5. Fiber Optic Cable exponentially increases the speed of data transmission due to the materials used. The cable is composed of bundles of glass threads that each transmit modulated messages in light waves. Retrieved from http://www.webopedia.com/TERM/F/fiber_optics.html on June 5, 2015.

6. Indigenous Systems of Knowledge (ISK) are the traditional philosophies and community practices that provide a foundation for Indian survival. C. West Churchman states that referring to this concept as a system acknowledges all of the parts that work together to shape our understanding and interactions in the world. Therefore, a system is “a set of parts coordinated to accomplish a set of goals.” Individual parts must work together and function properly to become a system.
7. Information Communication Technologies (ICT) refers to any technology that serves as a medium for communicating and production. For this research ICT specifically references the hardware technology necessary for achieving connectivity and specifically telecommunications.
8. Large Capacity Carriers (LCC) is a label used by Affiliated Tribes of Northwest Indians to identify major cellular signal providing companies, such as AT&T, Verizon and T-Mobile.
9. Microwave is the principal carrier of high-speed telegraphic data transmissions between stations on the Earth and also between ground-based stations and satellites and space probes. A system of synchronous satellites about 36,000 kilometers above the Earth is used for international broadband telegraphy of all kinds of communications—e.g., television, telephone, and tele facsimile (FAX). Retrieved from <https://www.britannica.com/science/electromagnetic-radiation/Microwaves#ref307310> on April 8, 2015.
10. Pacific Northwest Tribes are identified by their Salish and Coast Salish Languages. Geography separates Coast Salish Peoples and Salish Peoples. As such, Coast Salish Peoples share coastlines with the Pacific Ocean and Salish Peoples are generally referred to as Plateau Indians, because they live in semi-arid lands east of the Cascade Mountains. Retrieved from, <http://www.britannica.com/topic/Salish>
11. Rationality as defined by Shawn Wilson, in his 2001 book titled *Research is Ceremony: Indigenous Research Methods*, page. 177, “An Indigenous paradigm comes from the fundamental belief that knowledge is relational. Knowledge is shared with all creation. It is not just interpersonal relationships, or just with the research subjects I may be working with, but it is a relationship with all of creation. It is with the cosmos; it is with the animals, with the plants, with the earth that we share this knowledge. It goes beyond the idea of individual knowledge to the concept of relational knowledge . . . [hence] you are answerable to all your relations when you are doing research.
12. Self-Determination Public Law 93-638. Congress underlined the US obligation to respond according to Indian Peoples’ right to self-determination. The response required assurances to Indian Peoples’ participation in the direction, planning, conduct and administration of education and other Federal programs and services. The motivation encompassed integration of Indian communities’ vision for programs and services that would respond to the needs and desires of their communities.

13. Sovereignty is a legal term that recognizes American Indian and Alaska Natives' nation-to-nation relationships with the US. The Bureau of Indian Affairs defines sovereignty as follows, "Their strength in numbers, the control they exerted over the natural resources within and between their territories, and the European practice of establishing relations with countries other than themselves and the recognition of tribal property rights led to tribes being seen by exploring foreign powers as sovereign nations, who treated with them accordingly." Retrieved from <http://www.bia.gov/FAQs/> on June 3, 2015. For my research project, I use Blacks' Law Dictionary's definition and the following, "In 1832, Worcester v. Georgia declared Indian tribes to be 'distinct political communities, having territorial boundaries, within which their authority is exclusive, and having a right to all the lands within those boundaries, with is not only acknowledged, but guaranteed by the United States.' 31 U.S. 515,557 (1832)." (Anderson, Robert T.; Berger, Bethany; Frickey, Philip P., Krakoff, Sarah. American Indian Law and Commentary. St. Paul: Thomson/West, 2008, p. 311.)
14. Telecommunications refers to digital connectivity through the use of cellular capable hardware and infrastructure. This dyad is commonly referred to as cell phone connection.

APPENDECIES

Appendix A – Tribal Council Members Interview Guide

1. What does Information Communication Technology mean to you?
2. What does telecommunication mean to you?
3. What is your opinion of the state of Information Communication Technologies in your tribe?
4. What is the state of telecommunications in your tribe?
5. In what ways, if any, is the tribal council utilizing ICT and telecommunications to support community growth and development?
6. In your opinion, what do you need to make decisions concerning Information Communication Technology adoption and propagation?
7. Which organizations played a role as you determined telecom implementation at (Puyallup or Tulalip) on the reservation?
8. What do you usually think about as you reflect on what you heard regarding ICT proposals for adoption and implementation?
9. If you could have your wish, what would telecommunications look like at your tribe?
10. How do you go about understanding what your tribal members desire from ICT and telecommunications?
11. How has the growth of ICT in your community impacted your own systems of knowledge?
12. Can ICT be utilized to strengthen your knowledge systems?
13. What are the positive aspects of growing ICT in your tribal community?
14. What are the negative aspects of growing ICT in your tribal community?

Appendix B – Tribal Member Interview Guide

1. What do you think about your telecom service?
2. Do you mind if I ask which service provider you are using?
3. Why did you pick that service provider?
4. Are you aware of the ICT decisions the tribal council made in the past year?
 - a. If not, have you experienced any changes in your service?
 - b. If so, what did you think about those decisions and do you believe you were impacted by the decision(s)?
5. What are the positive aspects of growing ICT in your tribal community?
6. What are the negative aspects of growing ICT in your tribal community?
7. If you were a council member, what if anything would you do to improve telecom access?