

Indigenous Internet: Nuances of Native American Internet Use

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ABSTRACT

We investigate Internet traffic logs on rural Native American reservations in California served by a tribally-owned Internet provider. The anonymous user browsing traffic and device preferences create unique failure patterns that reveal where connectivity is not well-served by standard networking technology. Geographical and cultural marginalization has lead to distinctive Internet usage when connectivity is available. For instance, residents commonly visit websites that are not as popular in the wider United States; and mobile devices dominate web request traffic, often with content-heavy video and media downloads, despite sustaining a higher rate of failure than desktop devices. This statistical analysis of passive measurements avoids institutional and cultural biases and ensures continuing research will contribute to a decolonizing narrative of Native American informational practices and values. Based on our analysis, we propose follow-up research angles to better understand the technological and social drivers behind these findings in order to improve user experience in this, and similar, networks.

CCS CONCEPTS

• **Networks** → *Network performance analysis; Network measurement;*

KEYWORDS

Indigenous networks, performance evaluation, traffic inspection

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1 INTRODUCTION

Between 2014 and 2016, urban areas of the United States (U.S.) saw the penetration of high speed cellular service rise from 81.9% to 90.5%. During the same time, penetration throughout tribal areas

remained a flat 64% while anecdotal reports put this number much lower [5]. Residents of U.S. tribal lands cannot assume constant connectivity nor the proximity of online content. In response to highly fluctuating connectivity conditions, along with the geographical and cultural isolation of many Indigenous American reservations, tribal communities develop nuances in Internet use that differentiate them from the more general American population [9, 10]. Understanding the differences that emerge from low-bandwidth, dispersed Internet use can help local Internet providers broaden Internet accessibility on tribal lands and increase the quality of use for America's most rural residents.

In this project we analyze anonymous network traffic collected within the Tribal Digital Village network (TDV)¹, a tribally-owned Internet service provider (ISP) founded in 2004 that brings access to homes, educational centers, and community hubs across 17 tribes in 13 Native American reservations in eastern San Diego county, California. Using traces collected over five weeks in February and March 2018 from seven distinct reservations, we characterize the way residents within these communities prefer to go online. This ongoing study has revealed new insights into the quality of connectivity experienced by TDV users by identifying access and usage patterns that may not be well-served by the standard network equipment configuration. Our findings include:

- The most popular websites visited by TDV users do not align with the most popular websites across the U.S.
- Mobile devices interact with more video and image download sites, while fixed-devices are more likely to interact with adware.
- Most connection failures are due to the originating device canceling the request.
- Mobile devices experience more failures than desktop devices across all brands.

2 RELATED WORK

The path to effective information and communication technologies (ICT) on sovereign lands within the U.S. depends on the determination of Native nations' leaders to take control of the digital information flow surrounding indigenous social and political goals [4]. Indeed, the developers of TDV overcame many unusual geographic, economic, technological, and political struggles to take the initiative for their own Internet access and still continue the fight for reliable connectivity in the face of public disinterest [7].

Studies of Internet use in other marginalized communities include [2], [6], and [8]. Six weeks of web traffic from a primary

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Table of Contents Native American Internet Guide

1. Understanding the eBook Native American Internet Guide
 - The Rise of Digital Reading Native American Internet Guide
 - Advantages of eBooks Over Traditional Books
2. Identifying Native American Internet Guide
 - Exploring Different Genres
 - Considering Fiction vs. Non-Fiction
 - Determining Your Reading Goals
3. Choosing the Right eBook Platform
 - Popular eBook Platforms
 - Features to Look for in an Native American Internet Guide
 - User-Friendly Interface
4. Exploring eBook Recommendations from Native American Internet Guide
 - Personalized Recommendations
 - Native American Internet Guide User Reviews and Ratings
 - Native American Internet Guide and Bestseller Lists
5. Accessing Native American Internet Guide Free and Paid eBooks

- Native American Internet Guide Public Domain eBooks
- Native American Internet Guide eBook Subscription Services
- Native American Internet Guide Budget-Friendly Options
- 6. Navigating Native American Internet Guide eBook Formats
 - ePub, PDF, MOBI, and More
 - Native American Internet Guide Compatibility with Devices
 - Native American Internet Guide Enhanced eBook Features
- 7. Enhancing Your Reading Experience
 - Adjustable Fonts and Text Sizes of Native American Internet Guide
 - Highlighting and Note-Taking Native American Internet Guide
 - Interactive Elements Native American Internet Guide
- 8. Staying Engaged with Native American Internet Guide
 - Joining Online Reading Communities
 - Participating in Virtual Book Clubs
 - Following Authors and Publishers Native American Internet Guide
- 9. Balancing eBooks and Physical Books Native American Internet Guide
 - Benefits of a Digital Library
 - Creating a Diverse Reading Collection Native American Internet Guide
- 10. Overcoming Reading Challenges
 - Dealing with Digital Eye Strain
 - Minimizing Distractions
 - Managing Screen Time
- 11. Cultivating a Reading Routine Native American Internet Guide
 - Setting Reading Goals Native American Internet Guide
 - Carving Out Dedicated Reading Time
- 12. Sourcing Reliable Information of Native American Internet Guide
 - Fact-Checking eBook Content of Native American Internet Guide
 - Distinguishing Credible Sources
- 13. Promoting Lifelong Learning
 - Utilizing eBooks for Skill Development

- Exploring Educational eBooks

14. Embracing eBook Trends

- Integration of Multimedia Elements
- Interactive and Gamified eBooks

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