

Technical Paper
State Broadband Data and Development Program

U. S. Virgin Islands Territory

November 15, 2010

Background

The U S Virgin Islands Territory is comprised of a group of three islands to the east of Puerto Rico. The territory has a total population of about 108,000 residents. Most of the population resides on the islands of St Thomas and St Croix. The island of St John is a short distance to the east of St Thomas and is the site of a US National Park which occupies more than half of the land area on the island. St Croix is about 40 miles south of St Thomas.

Wireline communications services are available from one provider serving all three islands as well as Water Island, a small island in the Harbor of St Thomas. Wireline communications between the islands of St Thomas and St Croix is by submarine cable service leased from AT&T 45Mbps increments. Wireline communications between St Thomas and St John is provided by submarine cable operated by the Virgin Islands Water and Power Authority. Communications services are also available from three wireless carriers who employ microwave links between the islands. All four providers offer data communication services which meet the definition of broadband as defined in the SBDD NOFA of 768Kb down and 200Kb up. The wireline provider also offers T-1 service for commercial use. The Wireless operators also offer higher speed broadband services via dedicated links.

All four providers rely on submarine cable based data services from Florida for telephone and broadband data services. The cables are operated by AT&T (St Thomas) or Global Crossing (St Croix).

One historical note is that the Territory is a US possession as the result of its purchase from the government of Denmark in 1917. It has a locally elected governor and legislature and is represented in Washington, DC by an elected member of the US House of Representatives who participates at the committee level, but is a non-voting member. Two legacies from its past include driving on the left side of the road and the absence of a street addressing system as used on the mainland. Streets are meaningful within the context of ðestatesö only. We learned that street addressed based service locations are virtually nonexistent in provider record keeping. Billing is almost exclusively directed to post office boxes. Where service locations are recorded, they are generally in reference to known landmarks. The Territory has undertaken a project to study how to implement street addressing over the next 2 to 4 years.

The US Census bureau Tiger line files for the Territory (FIPS Code 78) do define a county structure (St Croix - 010, St John - 020, and St Thomas - 030) though counties are not used in the Territory. Tiger line files do provide census block, census block group, and census tract polygons for each island. Street segment files are not available.

Data Collection and Integration

There are four providers in the United States Virgin Islands (USVI) who provide internet services that qualify as broadband as defined by the NTIA for the purposes of the SBDD program. One provider provides a wireline, ADSL service, while the other three provide their services by means of wireless radio technology. All providers have maximum download speeds in the 768 kbps to 1.54 Mbps range and operate solely in the USVI.

The process of collecting data from the providers began through high-level meetings between the providers and representatives of the USVI Public Finance Authority (PFA). Providers were encouraged to cooperate with the collection of data and were given assurances of privacy of the information provided. Non-disclosure agreements (NDA) were agreed upon between each provider and Stratum Broadband (SBB), a private consulting company hired by the USVI PFA to perform the data collection and mapping functions. An important concern for the providers, in a very competitive closed system, was that the data provided to the mapping efforts would not be shared outside of SBB and the NTIA.

With the agreements in place, each provider made data and a technical resource available to SBB. The interaction and cooperation between each provider and SBB has differed from provider to provider, but the general pattern has consisted of an early face-to-face meeting, followed by email and telephone communications to collect and clarify the data. Each provider was given the opportunity to review and data submitted prior to the submission. In some cases, due to NDAs, more data was made available to SBB than they were permitted to share with the NTIA.

In the cases of all four providers, the broadband coverage data was received in different formats. The processes of generating coverage maps from the submitted data are described below, organized into three general cases:

Case 1, Wireline ADSL Provider

The ADSL provider provided SBB with a spreadsheet detailing the latitude and longitude of each of the provider's DSLAMs. Physical inspection of a few DSLAM locations, the wire infrastructure, and information concerning the DSL technology employed indicated that a reasonable expectation would be that ADSL service, at greater than 768 kbps, would be available within approximately 12,000 line feet from each DSLAM.

The DSLAMs locations were plotted using ArcMap from ESRI, and 12,000 ft buffers were drawn around each location. Comparing these circles to known road and utility pole paths, manual modifications were made to the circular polygons to reconcile the coverage with reasonable wire paths. Additionally, feedback from Community Anchor Institutions (CAI), permitted some further modifications to the coverage polygons to account for known locations where service was not practically available. Finally, using tools available in ArcMap, intersection between the ADSL coverage areas and the 2000 US Census block polygons yielded a listing of census blocks where availability of ADSL coverage could reasonably be expected.

The provider was given the opportunity to review and challenge the coverage area. No modifications were made based on the feedback of the provider.

Case 2, Wireless Service Provider with RF Coverage Maps

One of the wireless service providers had already contracted with a company to provide Radio Frequency (RF) propagation maps. These maps were provided to SBB in the form of GeoTiff files. Visual inspection of the RF propagation maps laid over topological maps of the islands indicated that the coverage area was very reasonable for the location, heights, and technologies used by that provider. The GeoTiff files were converted to polygon shape files using tools available in the ArcMap program. The resulting polygons were manipulated to reflect coverage over land area only.

The provider was given the opportunity to review and challenge the coverage area. No modifications were made based on the feedback of the provider.

Case 3, Wireless Service Providers without RF Coverage Maps

Two providers, who both operate in unlicensed radio bands, did not have RF propagation maps, nor the inclination to collect the data required to generate one. Each provider was willing to provide SBB with locations, technologies, and direction of their access antennae. This allowed SBB to draw rough estimates of their coverage areas using the Google Earth tools, taking into account the provided radio information and the topology of the islands.

The providers were each sent files representing the estimated coverage and asked to modify it as needed to better represent where they believe to have coverage or not. After several iterations, each provider agreed on an accepted representation of its coverage and the Google Earth file was converted to an ESRI shape file.

While SBB was able to determine the reasonableness of the coverage areas, it is likely that each coverage area over-estimates the actual coverage area. However, in terms of habitated places on the islands, it is believed that the coverage is very close to actual.

State Broadband Map and Survey

The Territory has activated a web site to host a State Broadband Map. The website provides a composite picture of broadband availability on each island. The map page also includes links to the broadband service home page of each of the four providers.

The web site also hosts an interactive survey for broadband users. This survey has been developed and is undergoing use test review at the present time. While the survey data is intentionally anonymous, an interactive map of each island has been developed. Visitors will be requested to click on polygon representations of the census tract where they reside. The system captures the location data with the survey results for subsequent analysis.

Users will also be invited to activate a speed test using a link to a system being prepared for deployment. The speed test software product is a commercially available product being licensed for the project. The results of the test will be captured and reported periodically to the project.

The user will also be invited to volunteer to participate in performance testing which involves the deployment of a software client on the user's computer. The client wakes at specified intervals to perform a brief test which is captured on a central system for analysis. This testing will take place with a representative sample of users (up to 200) selected by the Territory in an effort to assure distribution in all locations. This software measurement system is a commercially available product licensed for this project.

Compilation of Community Anchor Institution Data

Research conducted with the aid of Territory agencies provided a list of some 325 CAIs. About 95% of the locations identified for these institutions were visited directly to verify GPS coordinates for planning purposes. Current broadband service information has been collected from some of these institutions. Collection from the remaining institutions remains to be completed.

Verification

As of the October 2010 submission of mapping data, the only verification that has been able to be completed is the check for reasonableness described in the Data Collection and Integration section above. It is expected that some external verification processes will have yielded data before the first submission of 2011. These verification methods will include things such as usage surveys, speed tests, increased communication and feedback with the CAIs, and for the wireless providers some spot checks of radio signal strength in areas where availability could be in doubt.