Cable and Telco SPAN Model

This document will guide you through the use of the Cisco® Cable and Telco Service Provider Abstract Network (CT-SPAN) model, so that you can effectively and accurately create high-level IP traffic and service revenue growth projections for your network based on variable service mixes and consumer adoption and use of those services.

Introduction to the Tool

The Cisco CT-SPAN tool is a high-level interactive tool that allows users—including press and analysts as well as customers and prospects—to estimate the total IP traffic that a cable or a telco service provider would generate from a combination of subscriber distribution and adoption of various residential services and applications over a 6-year period. The interactive Cisco CT-SPAN model also creates estimates of high-level service provider revenue that can be generated from the deployment of consumer and residential services such as broadband Internet access and digital television.

The CT-SPAN tool allows users to interactively customize IP traffic trends to a cable or telco service provider level. The model uses the same assumptions that are used in the Cisco Visual Networking Index™ (Cisco VNI™) forecast for detailed macro-level projection of worldwide and regional IP traffic trends. It is a first step toward understanding the effect that a service provider's residential customers might experience on their networks when they adopt a variety of paid and unpaid network services. The Cisco CT-SPAN model helps identify the main factors of IP traffic for various nodes of a service provider's network: the end user, access (hubs and central offices [COs]), metro (video headends [VHOs]), and the core (super video headends [SHOs]).

The Cisco CT-SPAN model is simple and flexible enough to provide quick IP traffic estimates based on as many or as few inputs as the user desires. Regional defaults are provided where available, and users can either accept those default values or provide their own inputs.
The Cisco CT-SPAN model is a simple and flexible model:

- Works for both cable and telco providers
- Accommodates as few or as many inputs as the user desires
- Provides for user-defined revenue-generating unit (RGU) or application across a variety of end-user devices
- Can adjust average broadband speed, encoding and compression technique, average revenue per user (ARPU), etc.
- Provides IP traffic estimates with and without the impact of broadcast television
- Offers ease of use, with regional defaults that users can use as a guidance or input

Getting Started

After you read the legal disclosure and accept the terms of use, you come to the Overview screen:

The Cisco CT-SPAN model has a menu bar at the top to help in navigation.

- **Overview**: This section describes the tool and directions about how to use it. Cisco CT-SPAN user guide and questions-and-answers documents are available here for download. Contact information is also listed, so you can ask specific questions about the Cisco CT-SPAN tool.
- **Service Provider and Subscribers Input**: This input tab allows you to select region, service provider type, subscriber distribution and growth, ARPU, and growth. Regional defaults are provided for growth rates and ARPU. You can also input device distribution for the subscriber base as well as input peak-to-average ratios for select Internet applications in this tab.
• **Application and Network Input**: Here you can input various broadband application adoption rates per end-user device category, digital television services adoption rates, and other network metrics. Regional defaults are provided for adoption rates.

• **Subscriber and Network Summary**: This section summarizes various views of subscriber, subscriber revenue, and IP traffic estimates for a 6-year period.

• **Traffic Comparison**: This section provides qualitative translation of the annual IP traffic estimates in terms of some common, day-to-day metrics.

**The Input Tabs**

To begin using the Cisco CT-SPAN tool, you enter data in the input tabs.

**Service Provider and Subscribers Input**

In the first input tab, you select the region in which you are interested from a pull-down list. You also select the type of service provider (cable or telco). The tab has three sub-tabs; on the first tab, labeled Input Subscriber and Revenue Data, you input the number of subscribers and average revenue per subscriber by RGU type for the year 2013, and provide their annual growth rates. On the second tab, Devices and Connections, you provide inputs for the number of devices per subscriber and the compound annual growth rates (CAGR). On the third tab, you can input peak-to-average ratios for a select set of Internet applications:

You can choose from six regions—Asia-Pacific, Central and Eastern Europe, Western Europe, Middle East and Africa, North America, and Latin America. Regional selection will lead to appropriate default values for subscriber and revenue data, device distribution per subscriber, service and application adoption, minutes of use (MoU), and bit rate per application. Global default values are provided for peak-to-average ratio inputs.
You can click the up and down arrows to the right of each input field to adjust the values or you can type the value directly in the field.

If you point the cursor over any subscriber category, it will give you a definition of that category. A list of those definitions is also provided in appendix B of this user guide.

You have the option to use default values for ARPU or the annual growth rates for your subscriber base—just click the Use Defaults button. When you click the button, default values are populated for these fields.

On the second sub-tab, labeled Devices and Connections, you can provide inputs for broadband and digital television devices per subscriber and their growth rates.

The last sub-tab is Input Peak to Average Ratio. Here global defaults are provided that you can change by either entering numbers directly in each field or using up and down arrows to the right of each field.

Second Input Tab: Application and Network Input

With the second input tab, Application Adoption Rates, you provide various broadband and digital television services adoption rates and other network metrics. The three tabs follow:

- Broadband Application
- Digital Television Application
- Digital Television Network
On the Broadband Application tab, you will see regional defaults for upstream and downstream average broadband speed as well as for broadband Wi-Fi adoption. There are also regional defaults for adoption rates for various broadband applications per broadband device. These rates are expressed as a percentage of the broadband subscriber base adopting that particular device.

You can change all of these default adoption rates based on your individual preferences or requirements by either clicking the up and down arrows or directly typing the value into the input fields. You can restore default values by clicking Use Defaults.

You can also create a user-defined application per broadband device type. The fields for the user-defined application become available for input when the box next to “User Defined Inputs” is checked. For a user-defined application you need to enter the MoU and bit rate (KB per minute). This entry is needed to calculate the IP traffic estimates for the application. A drop-down box allows you to choose the application category (video or data). Depending on your selection, the IP traffic for this application is categorized into the appropriate bucket.

On the Digital Television Application tab, you choose the digital TV service type—Internet Protocol Television (IPTV) or Cable/RF Overlay:

Here you also provide data about the adoption and MoU for advanced digital television services such as video on demand (VoD), time-shifted television. In this update, besides high definition (HD), new inputs for standard definition (SD) and ultra-high definition (UHD) have been added. The adoption of these services is expressed as a percentage of digital television subscribers you entered on the first input tab. Regional defaults are provided for your convenience.
On the digital television network inputs screen, you provide television network data:

If your digital television service type selection on the previous tab was IPTV, then you must enter the inputs for percentage of subscribers watching digital television service in unicast mode at any time as well as percentage of TV channels watched in broadcast mode. These fields are required to calculate IPTV traffic at the access point. The numbers provided for these fields are just place holders and not regional defaults. You can customize these fields according to your requirements. In addition, there are input fields for SD, HD and UHD (different from SD, HD and UHD adoption of services); SD, HD and UHD bit rates and compression improvement; and number of nodes, such as the number of hubs or central offices, VHOs, and SHOs in the digital television network. We have provided default values for your convenience.

You can change the default values shown by using the arrow buttons next to the fields or by writing directly into the field.

**Outputs: Subscriber and Network Summary and Traffic Comparison**

After you enter the inputs, simply move to either of the output tabs to view the dynamically updated results.

The following two types of outputs are featured:

- Subscriber and Network Summary
- Traffic Comparison
First Output Tab: Subscriber and Network Summary

With the first output tab, Subscriber and Network Summary, you can select from a list of summary outputs from a drop-down list. You can toggle between the data view and the chart view. Data is represented across a 6-year forecast period:

Following is the list of summary outputs that you can chose from:

- **Monthly Revenue in US $ (Millions) by RGU**: Monthly revenue projections for the main revenue-generating service categories in U.S. dollars
- **ARPU in US$ by RGU**: ARPU estimates for main service categories in U.S. dollars
- **Subscribers by RGU**: Distribution of subscribers across the main revenue-generating service categories (broadband and digital television)
- **Total Devices/Connections**: Total number of devices and connections forecast by device/connection category
- **Monthly Subscriber IP Traffic by Application**: Monthly IP traffic estimates in terabytes by applications for each RGU type
- **Monthly Subscriber IP Traffic by Application (without broadcast)**: Monthly IP traffic estimates in terabytes by applications for each RGU type without digital broadcast IP traffic numbers
- **Monthly Subscriber IP Traffic by Traffic Type**: Monthly IP traffic estimates by video, data, and file sharing
- **Monthly Subscriber IP Traffic by Traffic Type** (without broadcast): Monthly IP traffic estimates by video, data, and file sharing without digital broadcast IP traffic numbers
- **Monthly Subscriber IP Traffic by RGU**: Monthly IP traffic estimates in terabytes by main service category
- **Monthly Subscriber IP Traffic by RGU** (without broadcast): Monthly IP traffic estimates in terabytes by main service category without digital broadcast IP traffic numbers
- **Monthly Broadband Subscriber IP Traffic (TB) by Access**: Monthly broadband traffic estimates by access—fixed, fixed Wi-Fi, and mobile offload to fixed Wi-Fi
- **Monthly Subscriber Internet Video Traffic by Definition**: Monthly Internet video traffic estimated in terabytes by SD, HD and UHD. Internet video communications traffic is included in addition to other internet video traffic.
- **Monthly Subscriber IP Video Traffic by Definition** (without broadcast): Monthly IP video traffic estimated in terabytes by SD, HD and UHD. Internet video traffic as defined above is included in addition to IP VoD and time-shifted TV traffic. Broadcast TV traffic is excluded.
- **Monthly Subscriber Total IP Video Traffic by Definition** (with broadcast): Monthly IP video traffic estimated in terabytes by SD, HD and UHD. Internet video traffic as defined above is included in addition to IP broadcast TV, IP VoD and time-shifted TV traffic.
- **Total Monthly Access IP Traffic in Terabytes**: Estimate of total monthly IP traffic at network access
- **Average Monthly Access IP Traffic in Terabytes**: Estimates of monthly IP traffic per access node in the digital television network
- **Total Monthly Metro IP Traffic in Terabytes**: Estimate of total monthly IP traffic at network metro node
- **Average Monthly Metro IP Traffic in Terabytes**: Estimates of monthly IP traffic per metro node in the digital television network
- **Total Monthly Core IP Traffic in Terabytes**: Estimate of total monthly IP traffic in the core of digital television network
- **Peak to Average Ratio**: Estimate of cumulative peak-to-average ratio for all Internet applications combined
Second Output Summary Tab: Traffic Comparison

The second output summary tab, Traffic Comparison, provides qualitative translation of annual IP traffic estimates for the selected year, translating these estimates into some common metrics:

To see the results, first select a year and then select an IP traffic option (with broadcast or without broadcast) to see the translation of annual IP traffic estimates for years 2013 through 2018 into the following metrics:

- **Consumer content:**
  - Hours of mobile audio in millions of hours
  - Hours of video content in millions of hours
  - Millions of personal computers
  - Millions of tablets

- **Abstract environment:**
  - Total annual traffic in MB per person in the world
  - Number of trips around the earth

Note (*) For trips around the Earth, 1 MB = 1 mile, Earth's diameter = 7,926 miles. For traffic per person, world population is estimated be 7.2 Billion in Year 2013 according to the UN (June 2013).
Appendix A

This appendix explains the assumptions used to estimate digital television IP traffic at the various network nodes: the access, the metro, and the core. All of the other IP traffic estimates (broadband, dedicated voice over IP [VoIP], and user-defined RGU) are the same as the subscriber IP traffic estimates.

Assumptions for network broadcast IP traffic estimates follow.

Access
- Digital TV
  - **Broadcast TV**: Metro calculations for cable and RF overlay and on unicast vs. broadcast content percentage-based calculations for IPTV
  - **Video on demand (VoD)**: Subscriber-directed numbers
  - **Time-shifted TV**: Subscriber-directed numbers

  **Note:** All of these areas account for the compression technology deployed, HD penetration, and HD content availability.

Metro
- Digital TV
  - **Broadcast TV**: Based on the number of local and national channels broadcast
  - **VoD**: Subscriber-directed numbers
  - **Time-shifted TV**: Subscriber-directed numbers

  **Note:** All of these areas account for the compression technology deployed, high-definition (HD) penetration, and HD content availability.

Core
- Digital TV
  - **Broadcast TV**: Based on the number of local and national channels broadcast
  - **VoD**: All VoD content stored at the metro level so no VoD effect in the core
  - **Time-shifted TV**: All time-shifted content stored at the metro level so no time-shifted effect in the core
Appendix B

Definitions

Following are the definitions of various revenue-generating-unit (RGU) categories:

- **Broadband**: Broadband describes Internet access over data connection speeds higher than 144 kbps.
- **Digital television**: Digital television encompasses next-generation television services over cable or RF overlay TV or Internet Protocol Television (IPTV).

Following are the definitions of various broadband and digital television devices:

- **Personal computers (PCs)**: Computing devices, including laptop and notebook computers, as well as ultra-mobile PCs.
- **Smartphones**: Advanced mobile phones offering PC-like functions with an open operating system to support many applications.
- **Tablets**: Devices with ubiquitous connectivity focused on entertainment and casual computing with processing capability similar to advanced smartphones. They have 4- to 12-inch high-resolution displays, touch-screen interfaces (with or without stylus), and full-featured browsers and plug-ins.
- **Machine-to-machine modules**: Include hardware and software components for a variety of applications such as smart meters, business and consumer surveillance, inventory management, etc. that involve communications between intelligent nodes.
- **Web-enabled TV**: TV sets that can access web-based video content.
- **Set-top boxes**: Devices that connect television sets to the Internet. They receive and decode digital television signals to be viewed on TV sets.
- **Game consoles**: Internet devices that connect to TV sets primarily for playing video games.
- **Other**: Other Internet-connected consumer electronic devices that can access or display Internet content.

Following are the definitions of various broadband and digital television applications:

- **File sharing**: Includes peer-to-peer traffic from all recognized peer-to-peer systems such as BitTorrent, eDonkey, etc. as well as traffic from web-based file-sharing systems.
- **VoIP Internet**: Voice-over-IP (VoIP) as well as dedicated VoIP subscriptions from a broadband service provider or an independent VoIP service provider.
- **Online gaming**: Includes casual online gaming, networked console gaming, and multiplayer virtual world gaming. This category includes only the traffic generated from game play. The download of the game is included in “Web/Data.”
- **Online video**: Video downloaded from or streamed over the Internet, excluding peer-to-peer (P2P) video.
- **Internet video-to-PC**: Refers to online video that is downloaded or streamed for viewing on a PC screen. It excludes peer-to-peer downloads, and is distinct from Internet delivery of video to a TV screen through a set-top box or equivalent device.
- **Internet video-to-TV**: Includes video delivered through the Internet to a TV screen by way of an Internet-enabled set-top box or equivalent device.

- **Video communications**: Includes Internet video calling, video instant messaging, video monitoring, and webcam traffic.

- **Web and data**: Include web, email, instant messaging, newsgroups, and file transfer (excluding peer-to-peer and commercial file transfer such as iTunes) and other Internet applications.

- **Time-shifted TV**: Includes personal video recorders (PVRs) or digital video recorders (DVRs)—attached to IPTV, cable, or RF overlay TV services—that allow recording of TV content to be viewed at a user’s discretion.

- **Video on demand (VoD)**: On-demand video programming that is streamed or downloaded through a TV set-top box using next-generation TV services such as IPTV and cable or RF overlay.