

SATPATH SkySwitch™

Distance Learning and Telemedicine Application Note

SatPath SkySwitch® is a new generation broadband VSAT satellite communications networking system earmarked for small to medium-sized networks which require flexibility in real-time traffic routing and a high degree of Quality of Service (QoS). SatPath SkySwitch® is an application oriented satellite network solution specifically designed to address:

- Low-cost, initial capital equipment investment for any network size
- Supports Point-to-Point, Point-to-Multipoint Star, Mesh, and Hybrid Star/Mesh Network topologies
- Broadband traffic information rates from 8 Kbps to 22 Mbps
- Optimum carrier bandwidth efficiency which reduces recurring space segment rental
- Intelligent multimedia traffic networking using a shared transponder bandwidth pool with Demand Assigned Multiple Access (DAMA) carrier assignments and real-time Adaptive Bandwidth-On-Demand (ABOD) information rate adaptability
- State-of-the-Art, high-performance digital modem/channel unit implementation with automatic propagation fading compensation and TPC/LDPC Forward Error Correction safeguards the highest available traffic Quality of Service
- Layer 3 routing for IP connections and Layer 2 VLAN Bridging



Distance learning and telemedicine network requirements are both supported using SatPath SkySwitch's SkyVideo™ service application. SkyVideo™ can provide networking services for one-way video with voice bridging, two-way video conference and bidirectional videoconference services between a number of nodes with or without the supervision of an OEM multipoint controller. Distance learning requirements cover a number of categories including: government sector for rural public education over lightly populated, large geographic areas; private universities for country wide, advanced college level academics by noteworthy lecturers and on-the-job training courses for geographically dispersed large private corporations and public agencies.

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Telemedicine requirements cover the transfer of patient medical treatment information between urban hospital staff and remote village medical clinics / traveling doctor locations in geographically dispersed areas without terrestrial infrastructure. Here patient X-ray, cardiogram, and ultrasound, etc. medical imagery can be relayed from the remote location to the urban hospital, where specialists can review the information and offer real time corrective action medical treatment for the remote physician. Telemedicine requirements also cover video conferencing of actual remote location medical surgery whose procedures are instructed remotely in real time by the urban hospital specialists.



All of these networking applications require setting up in real time point-to-point or point-to-multipoint satellite compressed video circuits of appropriate bandwidth based upon actual traffic demand for the duration of the service need. Some will also require a duplex compressed video return channel while most will require duplex voice bridging for questions & answers or audio dialog. The SkyVideo™ service application can accommodate all of these distance learning and telemedicine requirements and provides the customer with a flexible network interface compatible with most 3rd party video conference and medical imagery equipment. Both synchronous serial data interfaces compatible with RS-530/RS-449/V.35 standards and the 10/100 Base-T Ethernet IP interface are supported by each SkySwitch terminal. The latter interface equipment has the advantage of sending IP data along with the compressed video and audio which is ideal for high resolution JPEG medical imagery files.

Figure 1 depicts a simplified satellite network level diagram supporting a distance learning application for rural public education. Here a MPEG-2/MPEG-4 compressed video conference lecture is being outbound from the Hub station and is received by all the remotes (i.e. Point-to-Multipoint). Typical information rates for this outbound carrier are 256 to 384 Kbps. All the remotes are capable of radiating a low rate inbound carrier to interrupt the lecturer with a question. Operation of the network is as follows: remotes which are following the lecturer and have no questions stay in active touch with the hub by bursting status messages periodically on the time shared Communications channel. When a student at a remote wants to ask a question to the lecturer, a service request message is sent to the Hub Network Management and Control System (NMCS). The NMCS in turn assess the free carrier space in the satellite DAMA bandwidth pool and assigns a SCPC carrier frequency and information rate to the respective remote by appending a control packet onto the Hub outbound carrier. The hub assigns a receiver to this SCPC carrier frequency and the respective remote tunes its transmit carrier to the assigned SCPC configuration. Handshaking occurs over the new channel followed by voice from the remote student. The hub video conference equipment incorporates an audio bridge which will combine the lecturers audio with the respective remote's student so that the whole class audience can hear both the

question and the lecturers response. Once the dialog between a remote student has ended that remote site takes down its SCPC radiated carrier and returns to the inbound CSC carrier. It then sends a termination message to the Hub NMCS. The NMCS in turn removes the SCPC carrier from active service and places the carrier bandwidth back into the free DAMA bandwidth pool for future services. The NMCS also instructs the Hub to remove the SCPC receiver from active service. The network access time for remote questions is under 2 seconds using the above approach in the SkyVideo™ service application.



SatPath SkySwitch® features both SkyWeb™ and SkyMesh™ terminals for the video applications. A SkyWeb™ terminal is designed exclusively for star connection, while a SkyMesh™ terminal supports many mesh applications. SkyMesh™ terminal allows a remote terminal to host a video session for training, meeting, or tele-medicine. SkyMesh™ terminals also allow any remote station to receive simultaneous multicast video images from multiple remote stations.

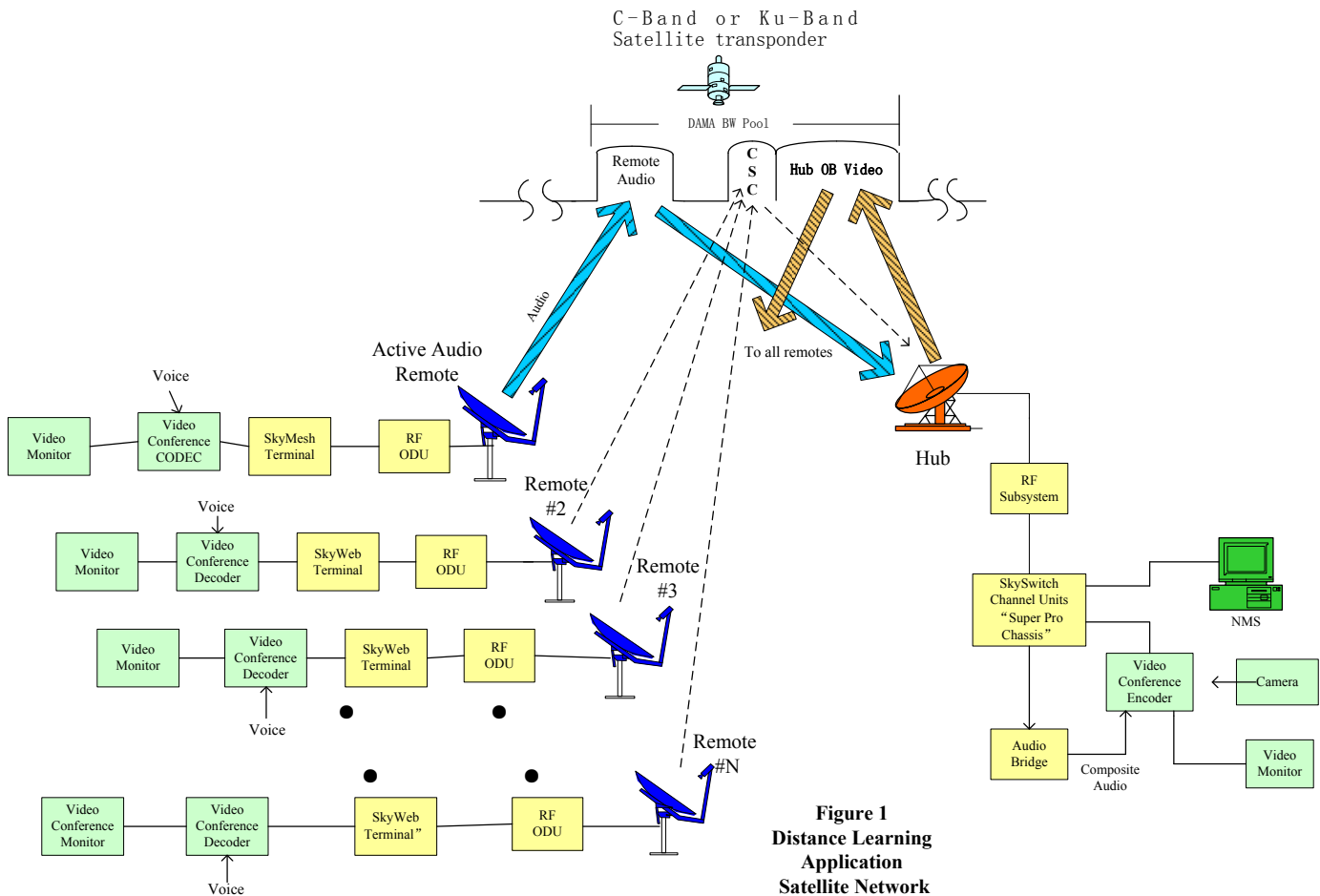


Figure 1
Distance Learning Application Satellite Network

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