



Teleport in Ellenwood, Georgia. Photo courtesy of Intelsat.

Gateways to communication

The glamour of the satellite itself tends to take over as far as networks are concerned but have you ever stopped to think about how the signal sent by a satellite reached your device at home or in the office? It's all down to regional gateways. Satellite Evolution takes a look at an often-overlooked but very important piece of the ground segment.

Regional gateways are key to our reception of phone calls, the Internet, IPTV, mobile TV, HDTV, VoIP – need I go on? The gateway itself is owned and managed by the service provider for the country in which the gateway is located. It receives the transmissions from orbiting satellites, processes the calls and then switches them to the appropriate ground network. The function of a regional gateway is to provide an interface between the country where it is located and the

land-based network. It connects the satellite with the public switched telephone network (PSTN).

A gateway may be independent if it receives its own unique set of channels or a redundant gateway if it receives the same set of channels as at least one other gateway.

A gateway usually comprises three or four dish antennas, a switching station and route operating controls. The gateway provides seamless integration with local or regional telephony and wireless networks. For example, let's look at the way in which Globalstar's regional gateways operate. Each regional gateway incorporates the following:

- **Ground Operations Control Centre (GOCC).** Is responsible for planning and controlling the use of satellites by gateway terminals and for coordinating with the Satellite Operations Control Centre (SOCC). The GOCC plans the communications schedule for the gateways and controls the allocation of satellite resources to each gateway.
- **Satellite Operations Control Centre (SOCC).** Manages the Globalstar satellite constellation. The SOCC tracks satellites, controls their orbits, and provides telemetry and command (T&C) services for the constellation. Globalstar satellites continuously transmit spacecraft telemetry data that provides on-board health and status reports for the satellites. The SOCC also oversees satellite launch and deployment activities. The SOCC and GOCC



facilities remain in constant contact through the Globalstar Data Network (GDN).

- **Globalstar Data Network (GDN).** Is the connective network, which provides wide-area intercommunications facilities for the Gateways, Ground Operations Control Centre, and Satellite Operations Control Centre.

The gateways use a standard T1/E1 interface to the existing PSTN/PLMN systems and encryption ensures security.

Gateways in Asia

SingTel recently entered into a strategic alliance with Globalstar to construct and operate a Globalstar gateway ground station at its Seletar satellite earth station facility in Singapore. This will extend Globalstar's satellite coverage throughout Singapore and Malaysia, as well as parts of Indonesia, Brunei and the surrounding Southeast Asian maritime shipping region. The gateway will distribute Globalstar's products and mobile satellite voice and data services in the region. The Seletar earth station is the second in Singapore and is located near to the Lower Seletar Reservoir in Yio Chu Kang.

The agreement is the initial step needed for Globalstar to offer service with SingTel via the Seletar Earth Station. Globalstar will provide the necessary engineering and technical training support required for SingTel to operate the station. In addition, the agreement paves the way for both companies to deliver tracking and trace solutions for the maritime and logistics industries, using the Globalstar Simplex data network.

The expansion onto Southeast Asia is part of an overall strategic sales and marketing alliance. The region is one of the fastest growing in economic terms and, in addition, the Straits of Malacca is one of the world's busiest shipping lanes with heavy maritime traffic. This is a perfect opportunity for Globalstar who can provide voice, data and asset tracking and monitoring services beyond the reach of traditional, land based infrastructure. There is also a possibility of a second satellite gateway in the region but nothing has been finalised yet.

Iridium gateway

China Space Mobile Satellite Telecommunications Co. Ltd. (China Spacecom) has announced that it is planning to open an Iridium gateway earth station in 2007.

Iridium Satellite LLC and China Spacecom recently signed agreements under which Iridium will provide technical assistance for commercial activation and ongoing maintenance of the gateway. China Spacecom has been an Iridium service provider since December 2005.

The gateway, which will be located in Beijing, will support Iridium voice and data services throughout China and could be operational by the end of 2007.

The gateway will provide services that are in demand in the region for industries such as water resource management, hydrological monitoring, weather data collection, fishing vessel tracking, heavy machinery automation, environmental protection and transport voice and data communications for ships and aircraft on domestic and international routes.

The emergence of the China mobile satellite market will complement the huge growth witnessed in the terrestrial voice and data services market. Iridium plan to launch their IridiumNEXT next generation satellite constellation within the next 6-7 years and China obviously represents a significant market for these new services.

Shin Satellite

Thailand-based Shin Satellite's IPSTAR broadband satellite terminal is a low-cost, flexible and high performance 2-way satellite terminal that works in conjunction with the satellite and the gateway. The air interface employing advanced waveforms on forward and return channels is optimised for overall system efficiency.

The waveform for the forward channel is based on TDM-OFDM technology that utilizes bandwidth and power more efficiently. The forward channel is optimised to accommodate multiple data rates, a variable number of users of different modulation formats and forward error correction coding. In addition, the return channel is based on MF-TDMA technology for bursts of traffic and dedicated allocation for high bandwidth applications.

The waveform is fixed to a more robust modulation to ensure link-availability at low transmission power. However, if higher transmission bit rates are required, the return channel can be configured to dedicated allocation behaving like a SCPC-Like (pre-assigned TDMA) channel that can support higher transmit data rates up to 2.0 Mbps.

The IPSTAR terminal and gateway incorporate proprietary adaptive modulation and coding technology (ACM), and transmission architecture optimized for the IPSTAR satellite system. The interface for the terminal and gateway to any device or network is based on the industry standard Internet Protocol, to ensure seamless integration in existing applications, systems, hardware, software, and services and networks.

The IPSTAR network configuration is based on gateway STAR topology: a user terminal receives and transmits signals from/to a beam, which connects with a gateway. The gateway, in turn, connects to other networks such as the Internet backbone, telephone network, corporate headquarters and other IPSTAR gateways. Most countries under the IPSTAR service coverage have one or multiple gateways. This allows efficient integration of users to the terrestrial networks for various applications. There are a total of 18 gateways planned for IPSTAR services.

IPSTAR's advanced Adaptive Coding and Modulation technology provides an efficient use of RF power and bandwidth, allowing a high and flexible digital transmission rate, which allows the use of small antennas and transmitters. IPSTAR user terminals currently include the IPSTAR Enterprise Series and Professional Series for corporate and high-end residential users, and iCON Series for home users and SME.

Mediaports

SES New Skies' network of partner teleports in Asia serve as regional gateways. These gateways are known as 'Mediaports'. They are interconnected to terrestrial fibre networks and the Internet backbone to allow easy access to the SES New Skies fleet of satellites. A range of services are available from these facilities, including video contribution and distribution services, IP and video platforms, VSAT hub services, co-location, and data services.

Mediaports also link to local television studios, entertainment venues, and government premises, giving customers access to news and special events in important locales such as Washington, D.C., London, and Los Angeles as they break.

The Mediaports also feature climate controlled co-location facilities where customers can safely and conveniently house their equipment.

Through its location in Singapore, premium turnaround services and excellent connectivity to terrestrial network infrastructures and Internet exchanges, ST Teleport enables SES New Skies to offer seamless video, Internet and data transmissions between Asia-Pacific, the Middle East, Africa and Europe.

The Hong Kong Mediaport, operated by REACH provides direct coverage of more than two-thirds of the earth's surface from its extensive earth station facilities in Hong Kong and Australia. SES New Skies also has partner Mediaports in Perth and Adelaide, both owned by Newsat.

The Perth Mediaport serves as a major Australian-Indian Ocean gateway and access point to and from Central Asia, Africa, Europe and the United States. The Adelaide Mediaport features both C- and Ku-band antennas, supporting voice, video and data services across the Indian and Pacific Oceans and throughout Asia.



Gateways and regulation

As in many instances, regulation can prove to be a hurdle in the establishment of a satellite gateway. Complicated regulatory paperwork must be completed and, in addition the government issuing the licences for gateways may have to literally be convinced that installing a gateway in their region is a beneficial step. At least one gateway is required to cover a country. In larger countries such as China and India, multiple gateways will be required. Shin Satellite has a wide range of experience in deploying satellite gateways across Asia. Currently, Shin has 12 gateways in 8 countries – Thailand, Australia, New Zealand, Vietnam, Myanmar, China, Cambodia and India with 100,000 terminals deployed.

The issue of regulation when attempting to set up regional gateways is a specific problem for Shin as Nile Suwansiri, Head of Marketing for IPSTAR explained: "In every country we need a gateway and to do that, to import a gateway and to get a service going, there are a lot of regulatory hurdles. Some countries are very open such as Australia, New Zealand, Japan and Korea. On the other hand, some countries are very closed like Indonesia, China, India and Vietnam. But we use local partners and also those who have the rights to apply the licenses. We also convince them. We say 'first of all, we are not competing with you because you don't have a technology like this and second, we are able to reduce the price to the end-user or the government, and therefore, for the same amount of budget, you can deploy to more schools, for example'. We are not a threat we are actually giving them an opportunity, helping them. The goal of every government is to try to deploy to the masses as much as possible so with the same amount of money they can deploy more. We have been quite successful using that approach but we also have to go through the paperwork and the hurdles."

The regulatory scrutiny that faces satellite companies can be

extreme and it certainly seems that the only way around this problem is to lobby governments and administrations to simplify the process that must be followed and to convince them that this technology is not a threat but a means of making things better. Restrictions imposed by governments are often used to protect incumbent operators but restricting the satellite policy in countries such as India, for example, means that demand is artificially kept down leading to a reduction in growth, profits and tax revenues.

The open skies policy held by countries such as Australia and New Zealand has introduced competition and the streamlining of regulatory processes. Competition means lower prices for the end-user and a wider adoption of technology which can only be of benefit to a country's people.

Regulate to accumulate!

Without satellite gateways, there would be no means of communication. Their role in the chain is a critical one so it is vitally important that regulatory agencies allow their deployment. The Asian region is a hive of activity for the satellite industry at present and is expected to see healthy growth in the future. The huge, and as yet untapped market that may benefit from satellite-based communications is out there. Thuraya is the latest big player to begin an aggressive marketing campaign in the Asia-Pacific region ahead of the launch of its new satellite later this year. It has chosen South Korean company, APSI as a partner and is looking to develop more strategic relationships in the lucrative East Asian market. A satellite operator's access to a gateway means success or failure. This is why we must ensure that governments understand how detrimental long and drawn out regulatory processes can be and how damaging closed skies are, not just to those who wish to enter a market, but to that country's economy and people. ■



Photo courtesy of Globalstar.