

# APPLICATION NOTE

## Back-hauling 34/8 Mbps Point-To-Point ISP Backbone Over an E3 Leased Line — Using HSSI Modems and the AP3000

Satellite Division 

### Application Summary

With the explosive world-wide growth of the Internet, satellites are increasingly being used to provide service to the more remote regions of the world. The very high costs of satellite bandwidth call for very efficient network implementations. For example, a typical Internet connection requires far more downstream traffic than upstream, typically a ratio of four to one. This can be explained simply by looking at simple web browsing, the user issues a URL address, and the ISP returns a whole page, or pages of information. Since users find download delays frustrating, it is vital to provide the maximum downstream bandwidth. This means that for an efficient implementation, an asymmetric network is required.

As the Internet grew it became apparent that it was Nodal in nature. Main exchanges were predominantly US based and well known as the best place to peer your Internet traffic. Network Access Points such as MAE-WEST, MAE EAST and LINX carry a large proportion of the traffic. These nodes were nowhere near the main Carrier Earth Stations such as Pennant Point, USA (Teleglobe), and Goonhilly Down, UK (BT) for example.

Leased lines were required to connect the Earth Station and the Internet Node together. Carriers found it difficult to retain the correct Asymmetric nature of the Satellite service when they were transporting it over their Symmetrical leased line network.



## About the AP3000

Metrodata's Access Processor Range includes a 3 Port (AP3000), 4 port (AP4000) and 8 Port (AP8000) version. In recent months the AP range has had satellite specific hardware and software upgrades. This might be a new Module such as the Asymmetric HSSI 34/8Mbps Module used here, or something software related like Alarm masking for Simplex Applications. The AP3000 can support a range of different Asymmetric rates from 64k to 155Mbps.

The AP3000 has a 1.6Gbps Backplane, Built In auto-sensing 10/100BaseT port and a wide range of diagnostics and monitoring capabilities.

## 34/8 Mbps over E3 Solution Kit

When transporting 34/8Mbps across a leased line it is important to retain correct clocking and frequency throughout the end-to-end network. In the past a solution has been available to this application but it has required multiple pieces of equipment (between 4 & 14 depending on interfaces/speeds). With so many separate pieces of equipment keeping track of how each piece was clocked could prove difficult, especially when equipment might be in 3 different countries.

In order to overcome this problem Metrodata included much of the functionality required into the Access Processor platform. This meant that a solution was possible with between 2 pieces of equipment. These products are quite complex, and working out which modules are required is made easier by our Satellite Solution Kits.

Imagine you have this application: 34/8Mbps Over E3 Back-haul. It involves 2 x AP3000 Chassis and 6 Modules. With the 34/8Mbps E3 Solution Kit you have one order code and we do the rest.

## 8Mbps over E3 – Easy!

When the speed of the service is lower than the speed of the leased line we convert the data into ATM cells. For example when the leased line is 34Mbps we convert the 8Mbps to 34Mbps ATM. At the other end of the link we convert the 34Mbps ATM back to 8Mbps.

At the ISP POP, there will be a core IP router which in order for it to support an asymmetric connection will be fitted with a HSSI interface. This interface may utilise Frame Relay, PPP or even simple HDLC however it is transporting IP traffic. APX has as part of its wide range of Universal Interface Modules a Flexible Bandwidth HSSI Circuit Emulation Module which will transparently transport the entire HSSI payload utilising a ATM connection.

The next problem to solve is the WAN connection between the ISP POP and the Satellite Earth Station. There are several options, simply use ATM at DS-3 or even STM-1 to transport the 34/8 HSSI circuit, however unless this is part of a future growth plan, this is inefficient. The most efficient, in terms of bandwidth and cost solution is to use an E3 Leased Line between the POP and Earth Station.



This presents a little problem, however, how do you transport an E3 circuit emulation across an E3 link? (note that ATM AAL.1 adds around 12% overhead requiring at least a DS-3 to transport an E3 CE service ). APX provides a simple solution to this, and that is the E3 CBR Interface Module for the downstream link, and the E3 UNI Module for the upstream connection. In this case, ATM will be used to transport the E2 circuit using AAL.1, however, in the downstream direction, ATM will only be used internally to the APX allowing a conversion from E3 HSSI to E3 G.703. Figure 2, shows the installation required at the ISP POP.

## Interfacing to the Satellite Modems

The solution now requires the connection at the Satellite Earth Station to be designed. Since we have an E3 WAN connection carrying ATM traffic upstream and CBR traffic in the downstream direction the APX must be fitted with the E3 CBR Module (Downstream) and E3 UNI module (Upstream). The next issue to resolve is the interface to the Satellite Modulators and Demodulators, and almost certainly the Redundancy switch.

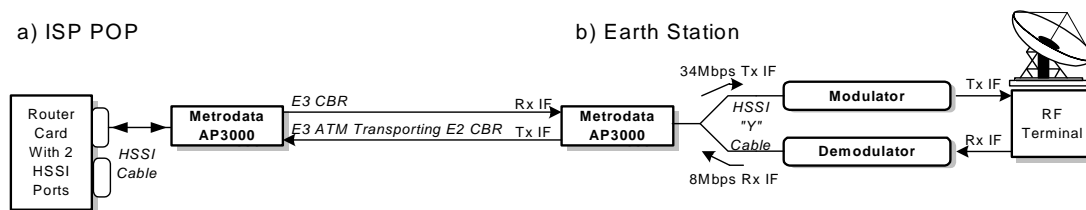


Figure 1: Back-hauling 34/8Mbps Over an E3 Link

## Contact Us

- Email: [sales@metrodata.co.uk](mailto:sales@metrodata.co.uk)
- Tel: +44 (0)1784 744 700
- Fax: +44 (0)1784 744 730
- Or visit the Satellite website at [www.metrodata.co.uk/satellite](http://www.metrodata.co.uk/satellite)

## Ordering Information

Power Supply	100 – 250 VAC	-48V DC
<b>34/8Mbps Over E3 Satellite Solution Kit</b>	xx-xx-xx tba	xx-xx-xx tba

