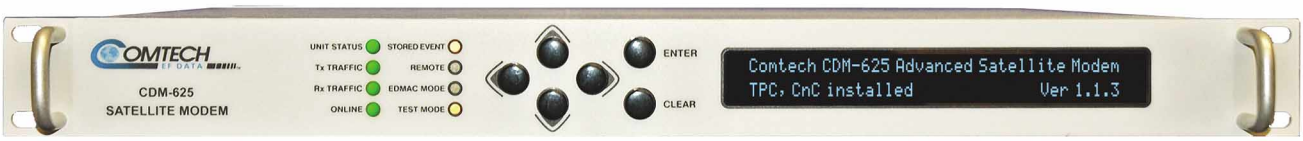

Time to retire some misconceptions

The popular assumption that SCPC is only suitable for serial data and TDMA to IP transport has lingered around the satellite communications industry for a long time. This is now being heavily disputed. We are pleased to present a whitepaper on this subject by Fred Morris, Vice President Global Sales Engineering for Comtech EF Data, as he strives to dispel the myths surrounding SCPC equipment and the damage that these misconceptions potentially have on the business.

It has been quite a number of years since Ethernet interfaces and IP transport have been available on most, if not all, baseband satellite communications equipment. However, to some in the industry, there is a misunderstanding of equipment and applications that can be summed up this way; Time Division Multiple Access (TDMA) is for IP data, Single Channel Per Carrier (SCPC) is for serial data. This is far from fact. A quick survey of SCPC manufacturers' websites will show quite the opposite case of availability of Ethernet interfaces for IP transport.

This misconception is also possible if one ignores the transmission compression techniques commonly available in SCPC equipment or the typical architecture of carrier implementation in networks with either technique; TDM carrier outbound from the hub with TDMA or SCPC return carriers from the remote sites. The real difference here is with the bandwidth savings on the return carriers. The TDM outbound carrier, whether in a TDMA or SCPC network, occupies about the same bandwidth, for the same traffic.

So how did this happen, this misconception between TDMA and SCPC? Its roots are in the historical development of these technologies. SCPC predates TDMA. TDMA was first used in the 1970s in Intelsat networks, and the technology worked its way into the first VSAT systems. In fact, arguably the first VSAT system was implemented by Federal Express in 1984. The objective of this network was to provide connectivity between Federal Express headquarters and remote shipping offices. This was for a service that was to be launched using high definition fax machines with a 56kbps network interface.

Prototype platform design

The prototype platform design used a Time Division Multiplex (TDM) outbound carrier with an SCPC return carrier. Federal Express named this the Saturn network. The follow on network expanded this design with a TDM outbound and a TDMA return. There were competing designs here; one based on a Frame Relay switch, the other built upon an updated Intelsat TDMA architecture. From this point on, for quite some time, all large scale VSAT networks for enterprises were TDM/TDMA-based.

These VSAT systems evolved to keep pace with new networking technologies. The primary work here was to address the transmission protocols in use at the time, such as SDLC, X.25, Burroughs Poll Select, or BiSync. Token Ring and Ethernet networking gained ground, and eventually IP networking was adapted by the enterprise market. VSAT equipment providers kept pace with this adaptation, and provided equipment with Ethernet interfaces.

At the same time, SCPC products had found their niche with trunking applications. Many satellite service providers were using SCPC equipment in SCPC/SCPC or MultiChannel per Carrier (MCPC)/SCPC services for international links carrying data, voice and sometimes video traffic. To standardize the technology, Intelsat developed the IDR / IBS modem specification, and all SCPC equipment for carrying traffic on Intelsat satellites met that standard. These IDR / IBS modems had serial interfaces.

Satellite service providers met the rapid growth of the Internet with equipment at hand. TDM/TDMA equipment in the late 1990s could support the IP and Internet requirements of an enterprise, but not for providing Internet trunking service to Internet Service Provid-

The rear view is of the CDM-625 modem shows that it is capable of IP transport, not just serial data.

ers around the world. (For instance, in 1995, all of New Zealand's Internet access was provided by a 2Mbps service from PanAmSat's Napa teleport.) SCPC modems fit this requirement, and serial ports on this equipment were expected by the service providers.

The market demand for IP was growing rapidly, as was the satellite service end user requirements for equipment that did not just bridge IP traffic. VSAT equipment providers that were focused on the enterprise markets addressed this need first. During the recession of 2001/2002, they then turned their attention to the government and military markets for sales. At that time, government and military market customers were beginning to also ask for more IP networking features to be in the equipment in their satellite networks.

Also at that time, government and military customers, who were familiar with SCPC, started to use TDM/TDMA VSATs for services to their distant locations. Their networks required IP-friendly end location devices.

TDM/TDMA VSAT manufacturers responded to that demand faster than SCPC modem manufacturers. For a brief period of time, the TDM/TDMA manufacturers outpaced SCPC modem manufacturers in providing equipment that met this demand.

This is no longer the case. The differences in IP functionality between TDM/TDMA and SCPC equipment is now minimal, if there is any difference at all. For the great majority of networks, the interface support by these equipment manufacturers is not a differentiating factor. Now, TDMA VSATs or SCPC modems fit well, from a network compatibility viewpoint, into most enterprise, government, or military networks. So how does a network operator make a choice of technologies?

The answer to that question is a value proposition, being the value of the technology. It is at the point in a satellite service provider's choice of vendors that the technologists yield to those in finance. Is capital expense more of a factor than operational expense, or is the opposite true? Is the satellite service provider willing to pay the capital expense for the equipment from vendor A, which is less than that of vendor B, when the operational expense of vendor B's equipment is less. Or, to phrase this differently, for the same size and traffic requirements of a network, a design using TDM/TDMA equipment may cost less than that of the SCPC equipment required; however, the cost of the space segment required for the SCPC design may be much less than that of the TDM/TDMA design. How is this so? There are many bandwidth compression techniques that are available in SCPC that are not in available in TDM/TDMA technology. Of course, this is not always the case between the two; there are networks with thousands of remotes where the capital expense for SCPC versus TDM/TDMA equipment would be too great to overcome any operational expense savings from SCPC in a reasonable period of time. There are surely some smaller networks where this may also be the case.

Sophisticated features

The points that have been made here are first, that from an IP standpoint, SCPC and TDM/TDMA equipment both support sophisticated features. The simplistic thought that "TDMA equals IP, SCPC equals serial" when applied to networks should have been left in the last century. A host of types of ports are available on equipment of both technologies. The second point made is that a comparison of equipment and networks between vendors of both technologies is not just done on the equipment itself. A comparison of the operational expense, especially that of the satellite transponder capacity which is required to support the network, is necessary for a complete assessment of the trade-offs between the technologies. At the present time, this complete technical and financial assessment could not be more important for your department's or enterprise's welfare and success. ■