Transporting Legacy Switched Digital Circuits Using a Packet Network

Engage Communication is the manufacturer of high-speed data communications products, specifically targeting the growing market for converting existing switched digital circuit connections (such as T1 and E1 telecommunication circuits) to packet based network connections (such as Ethernet or serial interfaces). High bandwidth data networks are obviously being installed and incorporated into the corporate infrastructure at a rapid pace. Access to company information, files, inventory records, shipping documents are all accessed over data connections transported throughout the world. But as this infrastructure of data (i.e., IP) communication interconnectivity is installed, the legacy communication links are still in use. These legacy connections include PBX trunks and dedicated digital voice lines (T1, E1). A key to a more efficient, less costly, communication infrastructure, as the company grows, is to make sure to utilize the new data network hierarchy to also upgrade the legacy voice network connections.

The Economics of Converting TDM Trunks to IP Networks

The use of the new packet network for transmission is advantageous in several ways. First, and foremost, once the data networks are installed, the capital expenditures to adapt the legacy connections for the new IP infrastructure are relatively small. The savings from reducing the private switched connections (T1, E1, frame relay) can be significant. Additionally, the new data network is now being managed via a common entity, whether in-house or external, all communications are now controlled via a common network and management service.

There are many articles today that discuss the need for IP backhaul of TDM circuits. The ever-growing infrastructure of IP data oriented networks provides an economic opportunity for carrying the legacy voice traffic. There can be multiple technology alternatives for transporting the voice traffic. The networks could utilize wireless (either licensed or unlicensed), private Ethernet, Metro-Ethernet, DSL, Cable, and WiMax. In the cable industry alone, cable modem technology has brought broadband Internet connectivity and additional packet services to a significant number of commercial customers. Employing this data connectivity to carry the more traditional digital voice trunks is a cost saving necessity for many existing private line customers.

In all cases, replacing the legacy switched circuit voice (and fax and PBX trunks) connections requires a robust technical solution. Adapting voice TDM to a packet network only to lose quality of service and expected service levels will not be tolerated. The equipment used to interface between the legacy connections and the new packet-based transport network must be easily installed, cost effective, secure and offer high standards of voice quality.

Any architecture that can carry IP traffic can be adapted, with the appropriate interface equipment, to carry TDM circuits as well. Any company or organization that uses digital voice circuits today and is expanding their data connectivity, can define a new ‘overlay’ network to incorporate both types of traffic and to save money. This system architecture is seen in many applied networks today. It can include

private enterprise networks connecting government facilities, school districts, police or fire districts, or legacy enterprise PBX interconnection. Essentially any existing network of digital voice circuits, both E1 and T1, can be adapted to a newer IP packet infrastructure. Private line services (point-to-point circuits leased by enterprises from telecommunications carriers) have shown significant growth for years and will continue to be an alternative solution for network connectivity. These leased links have traditionally been used to connect enterprise sites to each other and to the Internet. As the data network grows and is accessible, it is economically astute to adapt the IP network to also carry this pre-existing traffic and reduce the costs of the legacy point-to-point solutions previously required.

The New Cellular Network

It is obvious to all cellular service providers that the growing demand for digital content by mobile users requires a higher bandwidth backhaul solution. This demand for videos, streaming output, mobile Internet access is exciting for the user and also very exciting for the service providers. This high bandwidth demand is seen as dollar signs for the service industry, more bandwidth means more users paying higher subscription prices and more advertising revenues. But additionally more bandwidth, more IP-type data, will require a data-oriented network for access and connectivity to the caller. Traditionally, the connection between the serving tower and the switching center only had to support voice traffic. However, in the future, the network will be more oriented toward data than voice.

To help get the network ready for this transition, many providers are installing what has become termed, ‘an overlay network’. They are adding a second data-type network to support the legacy private line T1/E1 circuits. This is costly and requires time, but for the long-term service benefits, the installation can easily be justified. As this data network becomes ubiquitous within the cellular infrastructure, it also becomes apparent to the system designers that the private voice circuits could also be replaced by an IP infrastructure. With the installed fiber backbones, there is plenty of bandwidth available. And with the investment already justified, there is significant cost savings in sharing the IP solution as opposed to continuing the usage of high cost private line switched circuits (especially internationally, where E1 circuits can easily run 4-5 times the cost of a domestic T1 circuit).

Backhaul Economics – Simplifying Backhaul and Securing Voice over a Data Network

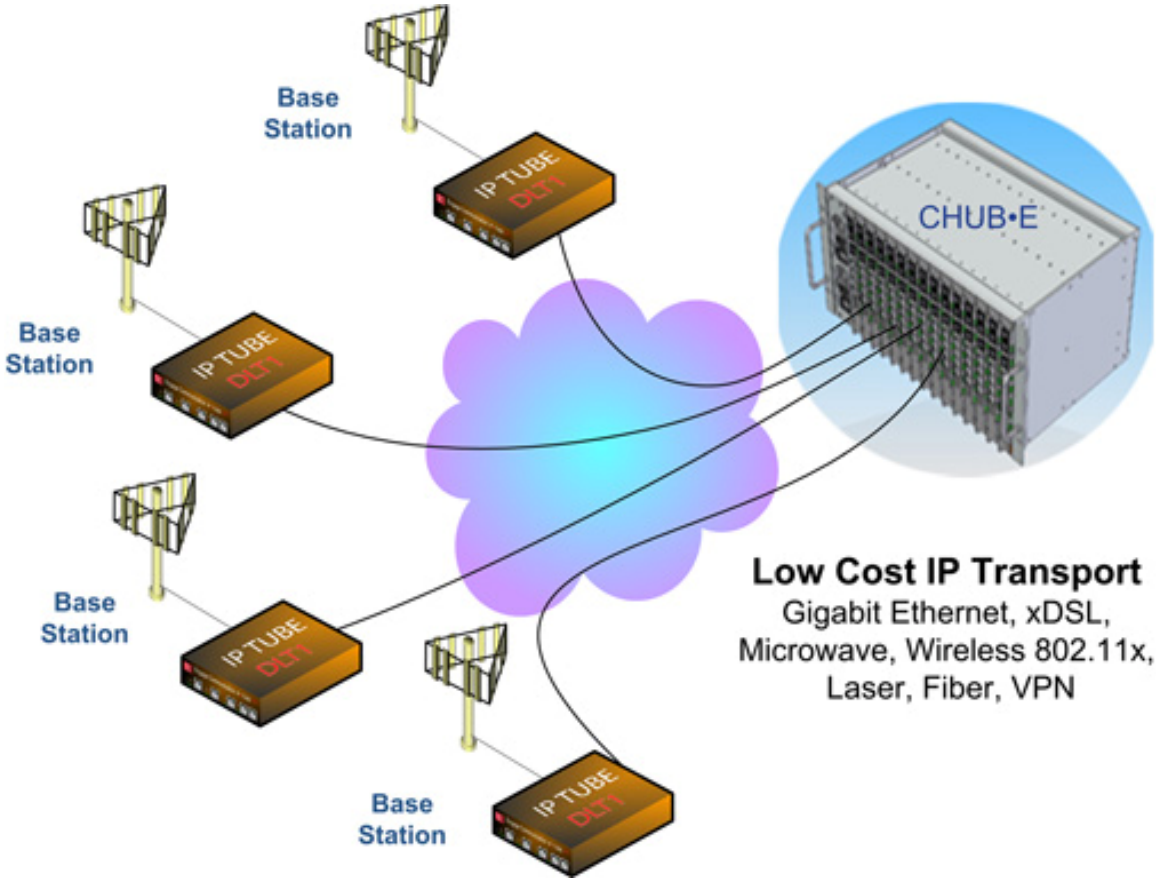
It has been presented that currently more than 90% of wireless cellular service backhaul is accomplished using leased high-speed private lines. Statistics show that today a standard, multi-user cell tower requires 3 to 5 T1s (in the US) to backhaul voice traffic to the switching network. Predictions are of growth to at most 8 to 12 T1s per tower, not an enormous amount of private voice traffic. On the other hand, as 2.5G, 3G and eventually 4G networks become the norm, the data bandwidth requirement will grow from about 6 Mbps today to 38 Mbps within the next 4 years. This is happening

while the number of towers being connected will also grow by almost 50%. The voice traffic still has to be carried but almost as a second thought in the mobile network of the future. Converting these circuits to packets, minimizing the bandwidth per voice circuit, and easily converging these circuits within this new data backbone is what is needed to simplify the new installations and make the cell network of the future more efficient and cost effective. Cost considerations are a big issue for the service providers; they need to simplify the new network interconnections to make sure the new data services will mean more money per user, not more problems per user. The conversion of the backhaul of wireless services is obviously a significant business opportunity. And the future trends in mobile services seems to portend even higher requirements for bandwidth as 3 and 4G wireless services become more ubiquitous and the demand for mobile real-time data services increases.

Engage Communication Offers IP Conversion, Compression and Encryption

Engage provides products that enable the voice to easily be carried and converted to this new IP infrastructure. Engage provide products that enable a compression of voice information to make it even less obtrusive on the data channels. Engage can provide encryption of voice circuits to provide a higher level of security for the voice communications being carried on the open data network of the cellular providers. The Engage IPTube products permit the Cellular service provider to efficiently convert the legacy voice circuits to IP compatibility. The Engage products are specifically design to provide a cost-effective solution to what will become an ever-increasing system design problem. Costs for the new data network are high, it is important to minimize the cost required to transport the existing traffic without negatively affecting the performance and the existing levels of service being experienced.

Cellular Backhaul over IP utilizing the IP•Tube T1/E1 is an economical solution that uses ubiquitous, flexible, and reliable IP/Ethernet services.



The Engage Communication IP•Tube is used to provide transparent interconnection of the base stations (BTSs), base station controllers (BSCs) and mobile switching centers (MSCs) over IP Ethernet packet-switched networks. The IP•Tube T1 maintains all the features of the cellular network BSC to BTS interconnections. Cellular phone service providers are able to save substantially by converting to a packet switch network from circuit TDM lease lines.

The IP•Tube has duplicate packet transmission and reception features that provide for resilient performance even through a lossy interconnect. The existing deployed investments in mobile switching technologies are retained while less expensive access technologies maximize the Return on Investment for the cellular provider.

The IP•Tube's transparent operation maintains the proprietary signaling required to support cellular voice communications. Voice quality is not compromised. The IP•Tube T1 is available with one to four T1/E1 interfaces and with one to two 10/100 BaseT Ethernet interface(s). The T1 interfaces have configurations that provide independent protocol, compression, packet sizing, buffering, clocking, framing, coding and channel settings. The protocols supported are IPTube and CESoIP.

The IP•Tube•C adds the power of lossless data compression. This optional functionality continuously detects idle/redundant data within each DS0 resulting in as much as a 56 to 1 bandwidth savings. TDM over IP bandwidth is not consumed by silent or redundant circuits. The IP•Tube•C lossless data compression option is ideal for environments where network bandwidth is limited such as point-to-point and point-to multipoint wireless, HFC cable modems, xDSL, Power Line Ethernet or the Internet.

The **CHUB** is 5U chassis suitable for ETSI or ANSI installations. The Chassis is designed to accommodate from 1 to 15 Networking, Telecommunication or Encryption modules from Engage Communication **IP•Tube**, **IP•Express**, **Black•Bond** and **Black•Door** product lines. The modules available are listed on the **CHUB** Order Form. Refer to the module Data Sheet for its specifications.

A 5U high 2 inch (50 mm) wide Power slot accommodates 2 Hot Swappable Commercial, Industrial or Military Grade Off The Shelf 1U Chassis Power modules that are available as Universal 90/240 VAC 50/60 Hz, Isolated -48 VDC, or 12 to 30 VDC. Each of the Modules is independently managed via its RS232 Console interface or one of its Ethernet LAN interfaces.