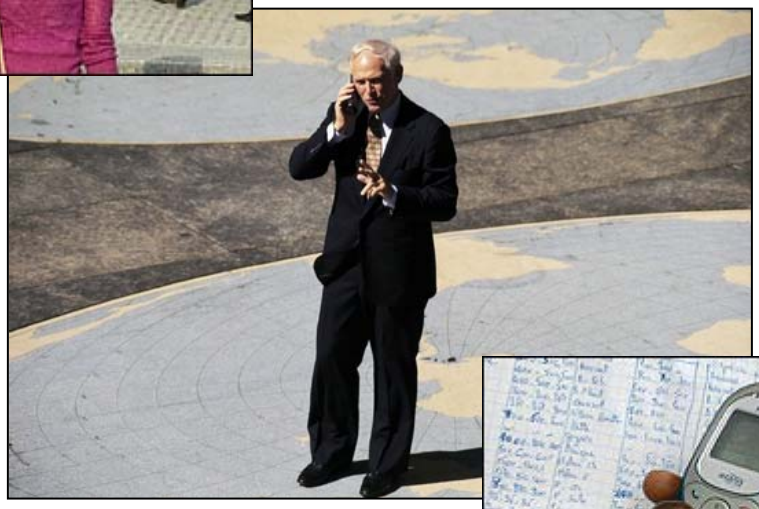
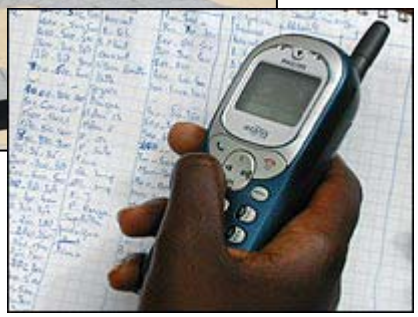
Optimizing GSM Abis Extensions Via Satellite

A technology solution that permits dynamic sharing of satellite bandwidth among multiple Abis links, producing dramatic cost savings

May 12, 2006





GLOBECOMM

www.globecommsystems.com

A little bit of satellite goes a long way ®

VSAT for Abis Extension

For some time, mobile operators have used VSAT (very small aperture terminal) satellite links to deploy base stations in rural and low-density areas sometimes known as "telecom islands." Satellite links are used to extend the Abis interface that, in the GSM architecture, connects the Base Station Controller (BSC) to Base Transceiver Stations (BSTs). This allows the operator to avoid the cost of deploying multiple instances of major network elements in areas where there is a need to provide coverage but too little local subscriber revenue to justify significant investment.

The standard design for the Abis satellite link is a dedicated single-carrier per channel (SCPC) link, with each BST allocated a fixed amount of satellite bandwidth. This approach works, but makes inefficient use of transponder capacity, which is the most expensive part of the satellite circuit. Some efficiency gains have been achieved recently by converting transmission to IP protocol, but they fail to attack the central cause of inefficiency. A dedicated SCPC link to a BTS must be dimensioned to provide enough bandwidth to handle peak traffic, which inevitably results in unused bandwidth during period of lower traffic flow. The typical design dedicates one or more full E1 links to each BTS, with idle GSM time slots carried across the satellite link.

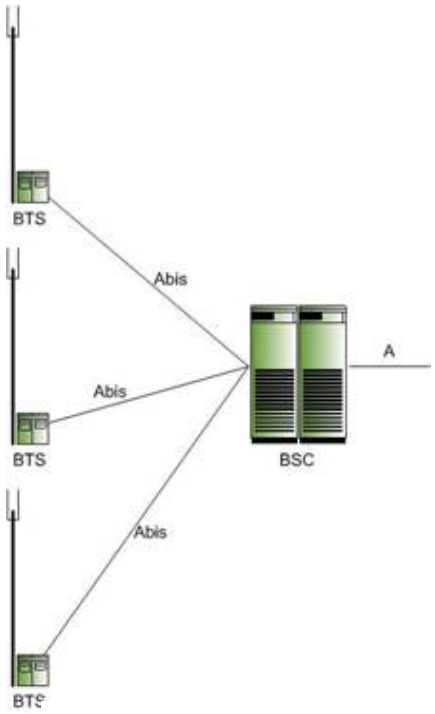
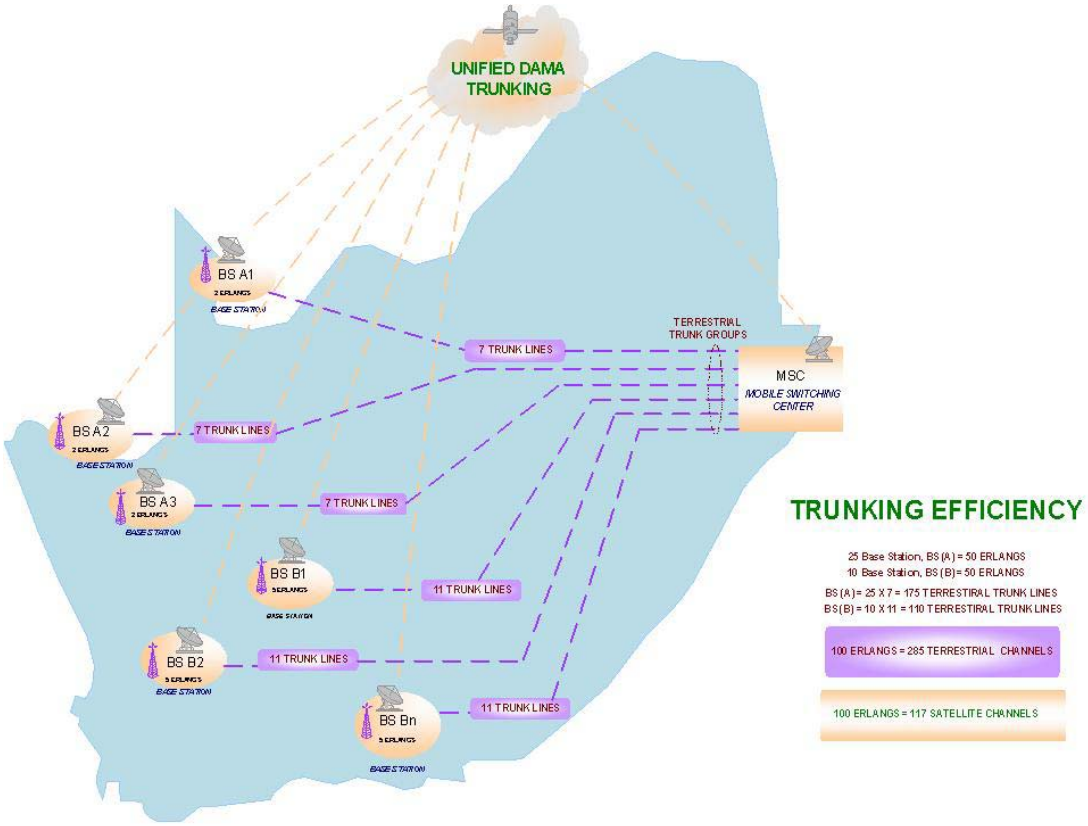


Diagram courtesy mpirical limited

Sharing the IP Stream

Globecomm has developed a powerful solution called SatCell® that optimizes the Abis stream for transmission over IP using best-of-breed technology from iDirect Technologies. Based on years of experience helping mobile operators with Abis extension over satellite, Globecomm has created a platform that drastically reduces transponder capacity needs by sharing a single IP stream between multiple Abis links. The SatCell solution exploits the strengths of iDirect's Demand Assigned Multiple Access (DAMA) Unified Trunking technology to assign access to the BSC instantly on demand. SatCell also suppresses idle GSM timeslots, rather than transmitting them over the satellite link, and allows base stations spread across a wide area to share a common pool of GSM

timeslots. This permits the GSM time slot to be used in the transport layer only, so that E1s are no longer dedicated to individual base stations.



This diagram shows a network that would normally require 35 terrestrial E1s to support six base transceiver stations. The satellite DAMA network, however, creates the equivalent capacity with only 100 GSM timeslots. If any BTS experiences peak traffic, it can instantly access up to a full E1 from the pool of timeslots.

SatCell achieves this high efficiency through mediation of the Abis streams to minimize bandwidth per time slot while maintaining QoS. Methods include:

- Protocol adaptation between the TDM BS and the IP-based iDirect network
- Elimination of idle packets
- Compression of signaling overhead

iDirect DAMA Architecture

In a typical configuration, the DAMA network employs a single outbound carrier operating at up to 9 Mbps and multiple demand-assigned inbound carriers operating at 256k, 512k and 1,025 Kbps to minimize remote terminal costs and totaling up to 4 Mbps of capacity.

Optimal network architecture depends on the varying traffic demands at the remote locations as well as long-distance traffic flows. For low-density, long-distance traffic, a star or mesh DAMA architecture is usually most efficient. High-density, long-distance traffic typically requires a DAMA overlay on an SCPC core using high-order modulation schemes such as BPSK, QPSK, 8PSK or 16QAM. The traffic correlation gains are highest for lower-traffic base stations.

Cost Savings

Globecomm's SatCell implementation of DAMA-based satellite Abis extension has produced remarkable cost savings compared with both standard SCPC satellite extension and terrestrial network extension. Using erlangs as a standard measure of traffic volume per hour and an average cost for satellite bandwidth of US$4,000 per Mhz per month, Globecomm has achieved the following bandwidth cost per erlang of traffic:

256 Kbps	512 Kbps	1,024 Kbps
$70	$65	$59

This compares with a typical terrestrial cost for serving the first erlang of traffic of US$1,000 per month.

About Globecomm

Globecomm integrates satellite into network applications in order to provide reliable, high-quality connection to the edge of the network, broadcast one-to-many, and support bandwidth-hungry applications. Globecomm is the only company in the industry that can, under one roof, design, install, integrate, support, manage and operate a customer's systems and networks, or provide turnkey services that offer the same features and functions as a customer-owned facility. Globecomm specializes in providing total solutions that free its

customers to focus on their core mission, whether it is telecommunications, broadcasting, retailing, serving constituents, maintaining security or projecting force. More information is available at www.globecommmsystems.com.