

# Local Switching

## Reducing GSM base station backhaul costs

The Local Switching solution offered by Cell & Sat significantly reduces the cost of operating remote cellular base stations. It complements the silence reduction and bandwidth gains of compression products, and detects situations where speech communications can be routed locally to avoid unnecessary transmission back in the network.

The Cell & Sat patented architecture is adaptable to any GSM compliant radio access network. It uses an optimisation server, external to the Base Station Subsystem equipments, to control the Local Switching function implemented in the Abis multiplexers / compressors developed by partner companies.

This solution is used by GSM operators to expand their cellular coverage or to reduce their existing transmission costs. It is adaptable to any backhauling system, whether wire or radio, terrestrial or satellite, TDM or IP. It is very effective in rural environments where satellite backhaul is used. Beyond the compression gains provided by the Abis optimizer platform, Local Switching reduces the satellite costs by a factor as high as 50% and improves the speech quality by avoiding double satellite hops.

### OPERATOR BENEFITS

#### Reduced OPEX

By eliminating double transmission between the base station and the core network for local calls, the throughput on GSM Abis backhaul links is significantly reduced.

This bandwidth transmission optimisation is provided in addition to silence reduction and signal compression gains of the optimizer platform.

#### Quality improvements

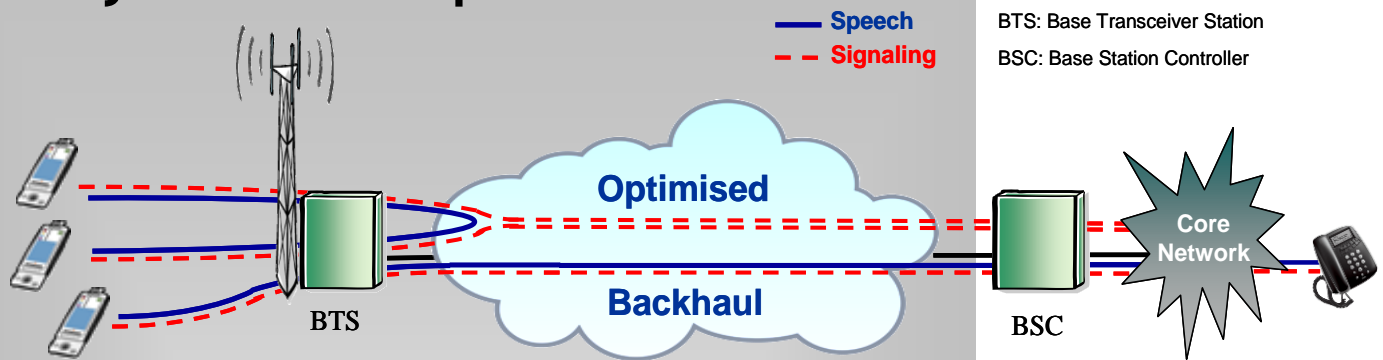
When satellite backhaul is used, Local Switching avoids double hop communications and therefore drastically improves end user perceived quality.

#### Adaptable to any GSM infrastructure

Local Switching is implemented between the BTS and the BSC and is compatible with any standard compliant GSM network.



# System Description

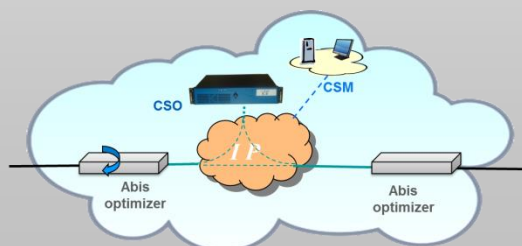


Local Switching is performed within the backhauling network, at the interfaces with the BTS. During a speech communication between two mobiles connected to the same backhaul terminal, only the signalling is backhauled while the speech information is routed locally. At the interface with the BSC, silent speech frames are generated and transmitted together with the signalling to maintain full inter-working with the GSM network.

The solution is adaptable to all GSM networks and to any transmission system. It detects automatically the BTS to BSC interface configurations. It is transparent to GSM services and has no impact on any operational functions such as subscriber management, billing, etc. Local Switching is also compatible with lawful interception requirements: whenever requested, the speech information is transmitted to the core network.

The Local Switching function has been developed on top of the Abis cellular backhaul optimisation platform. It involves a dedicated "Cell & Sat Optimisation" (CSO) server to analyse the GSM signalling messages exchanged over the Abis interface, detecting locally switchable calls and controlling the looping / un-looping of speech. In the Abis optimizer equipment a dedicated software manages the interface with the CSO and performs the "local looping" of speech. This software is remotely downloadable on installed base. The operation and maintenance functions are implemented in a "Cell & Sat Manager" (CSM) server.

Communications between the Abis optimizers and the CSO, use a packet switched IP transport layer. But the backhaul link itself can be either traditional TDM circuits or IP packet switched.



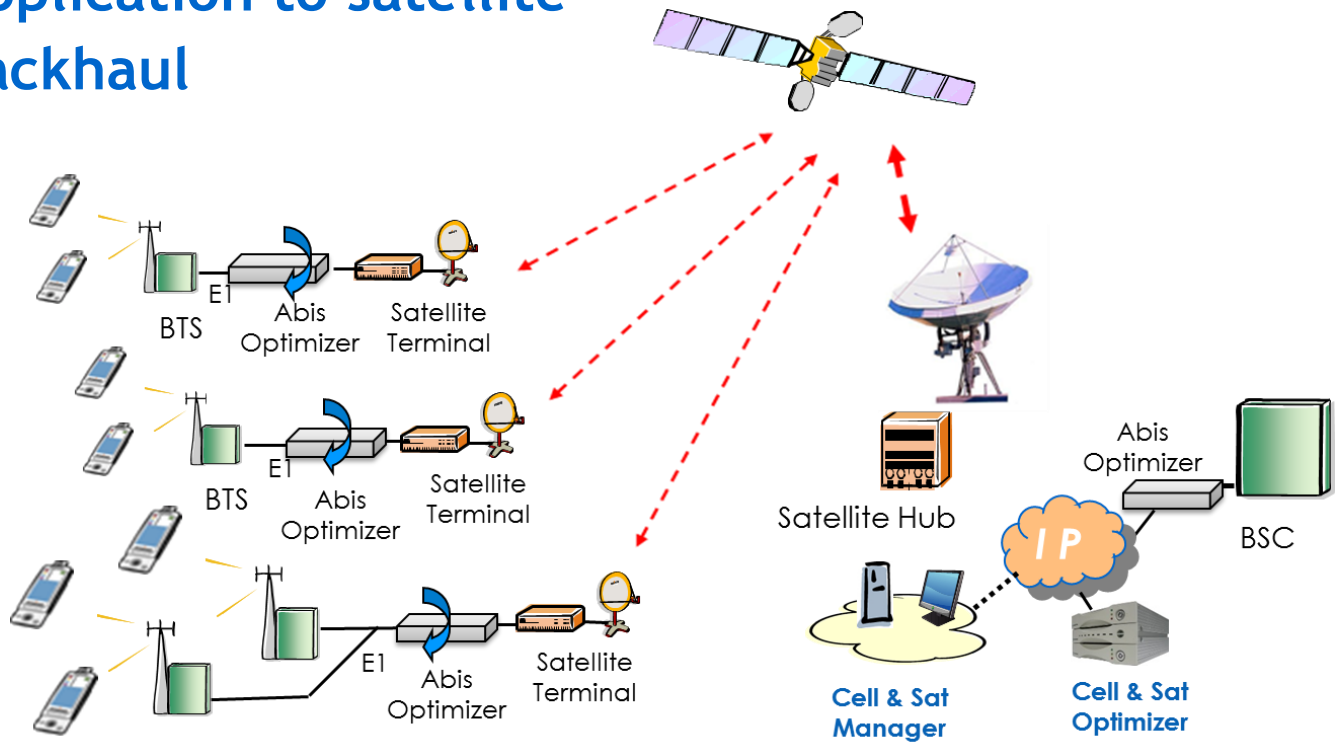
CSO = Cell & Sat Optimiser  
 CSM = Cell & Sat Manager  
 Local Switching of speech

BTS: Base Transceiver Station  
 BSC: Base Station Controller

## Features:

- **Configurations**
  - o TDM backhaul
  - o IP backhaul
  - o Terrestrial: wire / radio
  - o Satellite
- **Architecture**
  - o Multi-BSC CSO server
  - o Remote CSM manager
- **Abis interface**
  - o Multi-vendor
  - o Auto-discovery
- **Backhaul optimisation**
  - o Abis compression
  - o No local speech transmitted
- **Speech codecs:**
  - o FR,EFR, HR
  - o AMR-NB FR/HR
- **Compatibility**
  - o Intra optimizer handover
  - o Lawful interception
  - o GSM supplementary services
  - o GPRS data
  - o Transparent to GSM operations, and subscriber mgt functions
- **QoS management**
  - o SLA monitoring
  - o Overload control
  - o Fail safe operation
- **Software download / upgrade**
  - o Remotely operated

# Application to satellite backhaul



The Cell & Sat Local Switching solution, combined with the Abis compression features of the optimizer platform, is especially effective when connecting remote GSM base stations by satellite.

It is adaptable to any satellite networking technology: Single-Channel-Per-Carrier (SCPC, e.g. IBS-IDR modems), Demand Assigned Multiple Access (DAMA), IP VSAT. It can be accommodated in star as well as mesh architectures.

The application of Local Switching on the BTS - BSC link translates into direct savings in satellite cost as well as significant quality of service improvements. With non optimised satellite backhaul, local calls require two satellite transmissions: they are costly in terms of satellite resource, and they suffer from double-hop (600 ms) transmission delay. With Local Switching the transponder capacity requirements can easily be reduced by a factor 2 (assuming only one third of the calls being local) and there are no more satellite delay for local calls.

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## About Cell & Sat

Cell & Sat is an innovation company with a dual expertise in cellular and satellite technologies.

With a special focus on the reduction of costs to operate GSM networks in rural areas, Cell & Sat provides optimisation products and services to cellular and satellite operators willing to implement efficient terrestrial or satellite GSM backhaul. The Cell & Sat solutions benefit from the company expert knowledge in GSM 2G/3G system design, satellite networking, IP QoS optimisation, distributed protocol design, high efficiency database implementation.



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