



Isolated areas are not easily reachable : lack of terrestrial infrastructure, high installation cost and vulnerability for optical fiber and microwave links, very long deployment time.

❖ SOLUTION

The Satellite answers to various constraints . It allows:

- the coverage of isolated areas,
- the introduction of GSM services for market survey,
- the quick deployment (few days) in spite of the distance and the difficulty of access,
- temporary applications (before the start of the final terrestrial infrastructure; back-up,...)
- additional capacity, special events.



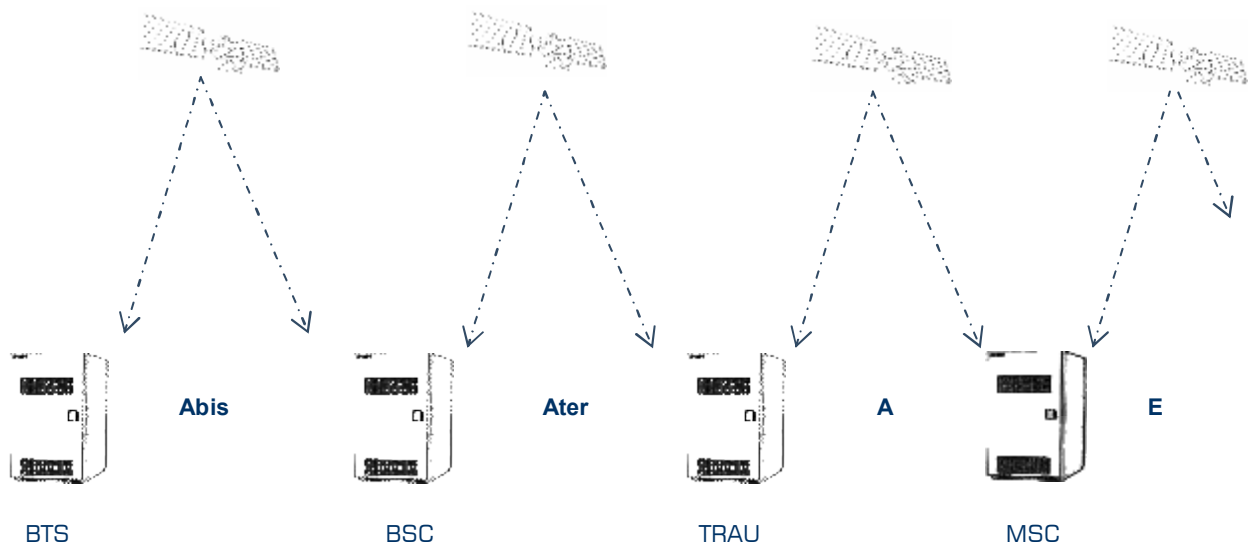
Satellite networks also brings significant advantages :

- links sizing following the evolution of the traffic on the different sites,
- cheapest implementation costs for low traffic areas,
- multiservices on the same links with dynamic bandwidth allocation (internet access, data, telecom, contents delivery...),
- mobile applications (ships, itinerant working sites...).



❖ WHICH INTERFACES ?

Satellite links can be used for each section of a GSM network (E, A, Ater, Abis). Each interface presents a particular and normalized format. It is possible to transmit those data as it is (transparent transmission) or with bandwidth optimization.



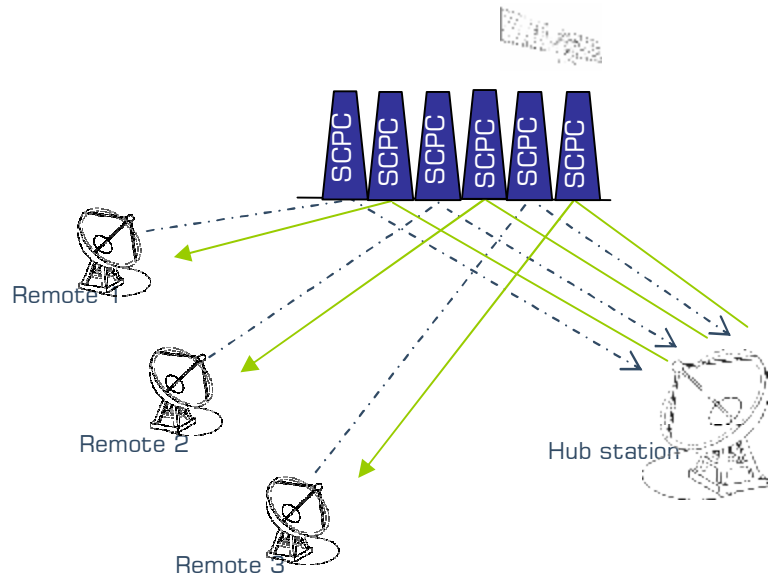


ARCHITECTURE

Point to Point :

Each link is established with a symmetrical pair of carriers. The network configuration is simple and ensures a high reliability. Each link is independent from the others; this allows to deploy the network day by day without affecting the operational links.

Space resources are provided permanently, site by site, and the optimization of the process allows reducing, site by site, the required bandwidth.

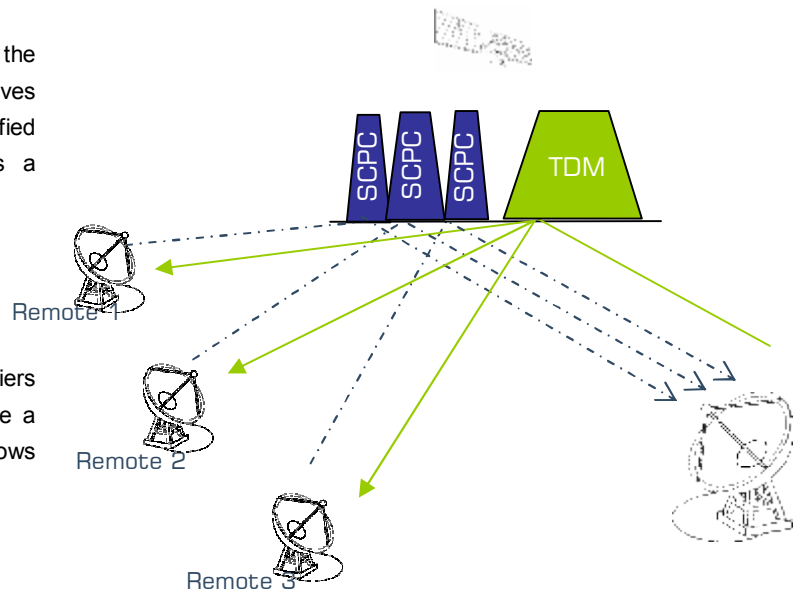


Point - Multipoint :

The hub station transmits a single carrier containing the traffic for all remote stations. Each remote station receives the same carrier but only considers its own traffic identified by its packet address. Each remote station returns a dedicated SCPC carrier.

Despite of a more complex configuration this architecture offers several advantages :

- investment saving (Capex): at the hub station (1 single modulator).
- space segment saving (Opex): as there are less carriers and also with the fact that the GSM operator will define a global level of service for the sum of the BTS's which allows a shared bandwidth on the central to remote links.



Hybrid solution :

In most cases, the best solution is an hybrid solution with several point-multipoint sub systems taking advantages of each architecture, taking into account the traffic density vs. the coverage requirements on a site by site basis. Metracom helps to identify the optimized network topology and proposes the more suitable configuration.





OPTIMIZATION OF LINKS - COMPRESSION

Interfaces E et A : E1 interface between MSC and satellite terminal (30 voice channels and SS7 signaling).

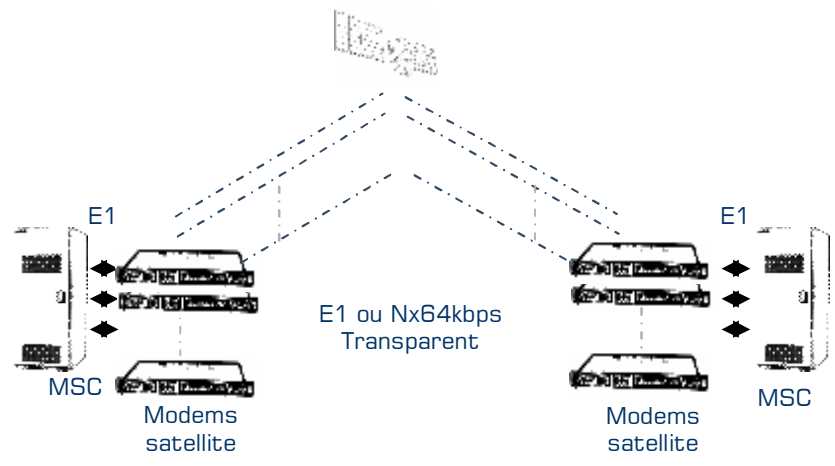
E1 Link over satellite (transparent mode) or possible voice compression through specific equipment.

Typical compression ratio : 12 :1.

Interface ATER Interface : E1 Interface between BSC / TRAU and satellite terminal (120 compressed voice channels and SS7 signaling).

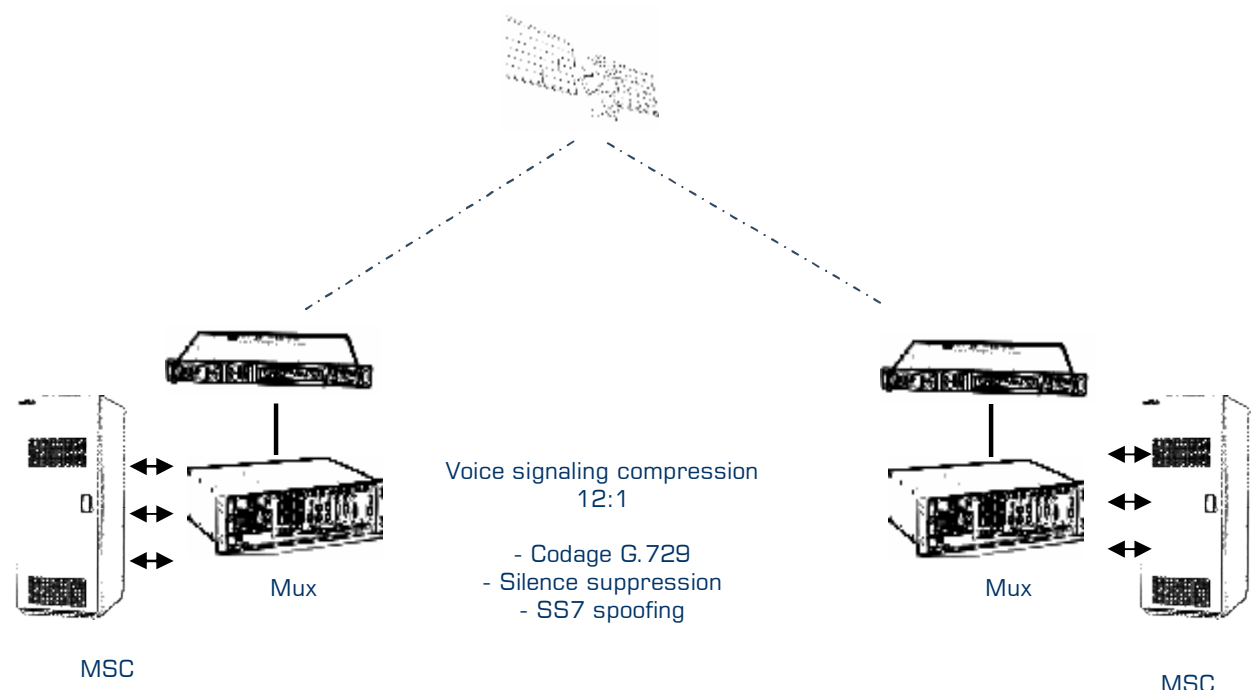
E1 Link over satellite (transparent mode) or additional voice compression through specific equipment.

Typical compression ratio : 40% to 50%.



ABIS Interface : Interface E1 Interface between BTS / BSC and satellite terminal. We advise a optimization of the transmission as most of the time slots of the E1 frame are empty. Metracom proposes several methods:

- Drop/ Insert Mode: suppression of the non used TS in the E1 frame before transmission to satellite. Data rate : Nx64 kb/s.
- Dynamic processing (signaling optimization, silences suppression). This process reaches 45% to 60% reduction for the bandwidth.
- Point-multipoint architecture: BSC traffic dedicated to all isolated BTS is provided by a single carrier and typically lower than capacities sum of each BTS (Erlang Law). This reinforces the optimization ratio obtained with the above dynamic processing technics (20 to 25%).

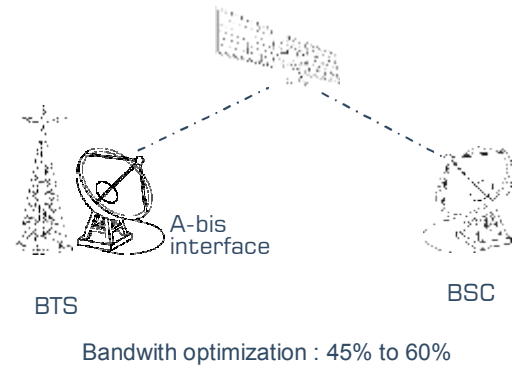


SOLUTIONS METRACOM



Point to Point Abis link with Mux compression

BTS Capacity (TRX)	Transmission with optimization	Bandwith reduction
1	100 Kb/s	61 %
3	260 Kb/s	49 %
6	480 Kb/s	50 %
9	720 Kb/s	49 %
12	960 Kb/s	46 %
24	1920 Kb/s	46 %
36	2880 Kb/s	49 %



STATION CONFIGURATION

METRACOM performs network and Earth stations engineering based on its expertise :

- choice of best suited technology
- identification of satellite through detail analysis
- link budget and network optimization (antenna size and RF compromise, most recent turbo coding and modulation schemes implementation to optimize the spectral occupancy (frequency band vs. Power balance),
- services aggregation (voice, data, coordination, supervision...) through the same network, to optimize the bandwidth revenues using QoS.
- network update implementation : new remotes sites deployment, traffic growth over the remotes, software releases...
- centralized supervision solution for the network allowing operator to control links status and quality of service in real time.

Metracom designed several type of solution according to different traffic configurations.



Different class of capacity

Site capacity	Typical configuration in C band
1 à 6 TRX	2m40 / 5w
12 TRX	2m40 / 10w
24 TRX	2m40 / 20w
36 TRX	2m40 / 40w
>48 TRX	3m70 / 40w

METRACOM, Satellite communications integrator

Competitiveness, Reliability, Neutrality, Quality are our commitments!

Because you and your projects are unique, we have to be a reliable partner for you. We want to be available and in touch with you in order to offer you suitable solutions as well as services and a real support.

So, we anticipate the technological developments, and we invest in those. We also make use of very strong partnerships contracted with the suppliers of technologies. For each project, we call on a specialist team services endowed with a great expertise acquired near operators, integrators, famous manufacturers belonging to the Satellite world. We are always at your sides here, over there, everywhere else.

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