The CERN GSM Monitoring System

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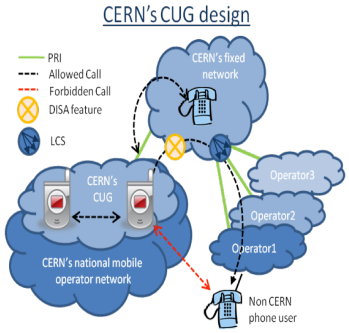
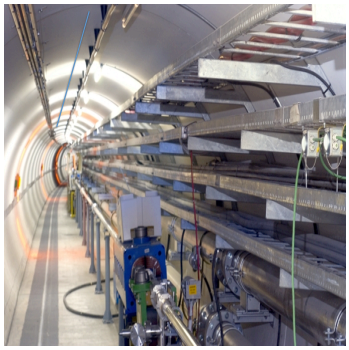
Monitoring GSM networks has become a crucial task for many organizations in order to be able to react appropriately in case of incidents. Mobile phone operators have their own monitoring systems, but they do not take into account corporate constraints and moreover, it can be necessary to evaluate independently an operators' performance against service level agreement. This poster presents the way CERN has approached the problem of monitoring its own GSM infrastructure and especially in the Large Hadron Collider (LHC) accelerator tunnel and other underground facilities, where this technology is the only means for inter-personnel communications.

GSM services at CERN

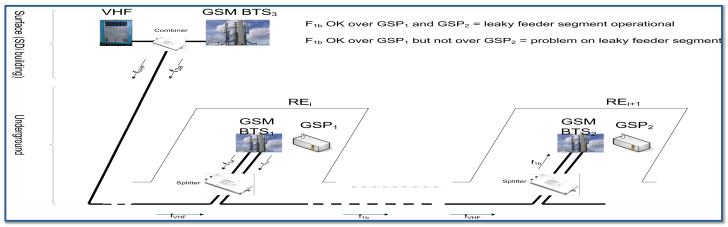
- Coverage of all surface sites ensured by the infrastructure of a national mobile operator
- A dedicated VPN with advanced services (short dialing plan, GPRS, call routing)
- More than 50 km of leaky feeder cable were installed by CERN to propagate GSM signals in LHC and other underground facilities
- GSM is the only means of inter-personnel communication in underground facilities
- The leaky feeder also carries the VHF signals, used by the fire brigade

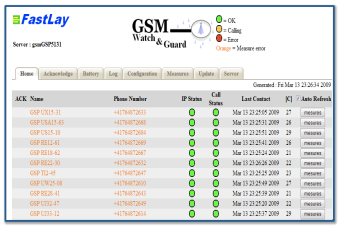


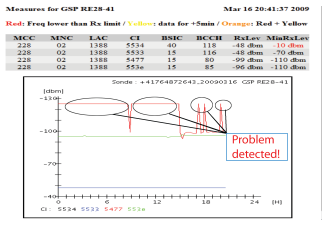


Concept of the monitoring system

- CERN developed, along with an industrial partner, a monitoring system which consists of GSM probes and one central server
- Each probe is configured to monitor a list of signals with respective minimum thresholds. If a threshold is reached, the server generates and activates an alarm to the CERN Control Center
- Probes are placed close to GSM emitters to monitor local signals, and also at the far end of leaky feeder cable segments to monitor the same signals
- If a local probe detects one signal not detected by the second one, we can deduce that this segment is not working

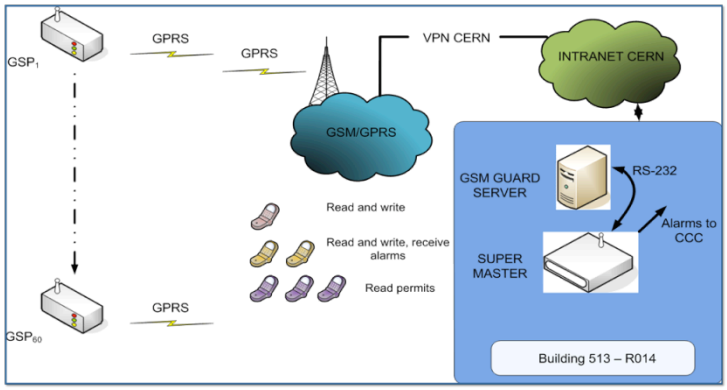






Measurements

- Probes send measurements to the server via a dedicated CERN GPRS network
- In case of a problem with the GPRS network, probes continue to send measurements using a safe mode (SMS messages)
- The current infrastructure consists of 60 probes placed in the LHC and other facilities and 3 servers receiving the measurements
- Storage of measurements: cable behavior over time
- The system has been working successfully for more than one year
- This monitoring system is being sold to other institutions by CERN's industrial partner
- Future work: monitor surface signals



http://www.cern.ch/it-cs