

GSMnet

GSMnet™ is a unique communication solution that provides the ability to create a self-contained, privately managed mobile network based on GSM cellular standards. The enabling technology of GSMnet™ allows local providers and military personnel to manage mobile phone access on the GSMnet™ communications infrastructure, delivering seamless cellular communications coverage to deployed military personnel, critical incident responders and demanding mobile users in remote or hazardous environments or where and when conditions have rendered existing macro GSM Cellular networks inaccessible.

Configurable as an optional integrated component within SiRRAN's [NOMAD Incident Command Platform](#) or as a standalone fixed system, GSMnet™ units are pre-configured to provide SECURE, reliable GSM Cellular coverage anywhere in the world at the press of a button.

Available in five configurations, four rapid deployment units and one rack-mounted fixed-mobile unit, each GSMnet include all of the hardware and software components required to facilitate a fully independent secure GSM cellular network supporting voice, SMS and data communications.

GSMnet Units

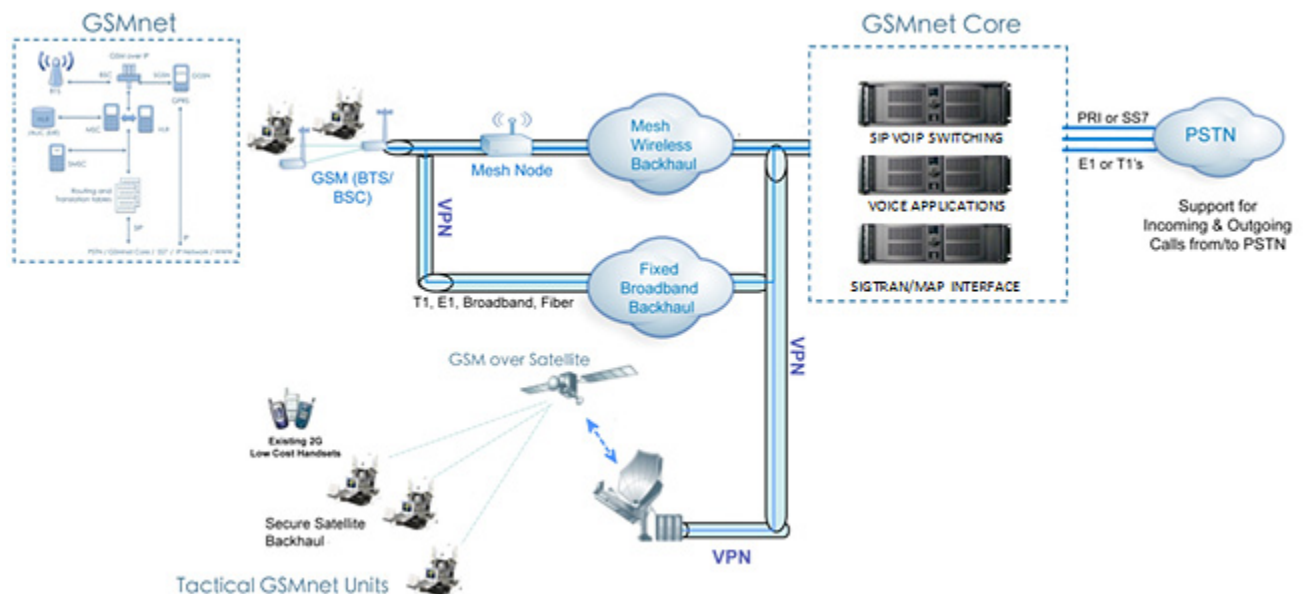


How GSMnet Works

GSMnet works in exactly the same way as a macro network like AT&T or Vodafone, in that it has the ability to transmit and receive voice calls, SMS messages and even data files between GSM mobile users and GSM mobile and PSTN users. GSMnet accomplishes this by leveraging SiRRAN's software Mobile Switching Centre (MSC), an integrated Base Transceiver Station (BTS), and an embedded Base Station Controller (BSC). Additional components of GSMnet include:

- Home Location Record (HLR)
- Authentication Center (AUC)
- Equipment Identity Register (EIR)
- Serving GPRS Support Node (SGSN)
- Gateway GPRS Support Node (GGSN)
- Private Branch Exchange (PBX)

GSMnet Architecture



Mobile Switching Centre

The software MSC's (Mobile Switching Centre) main function is to manage and co-ordinate the set up of calls. The MSC is a sophisticated switching engine that provides IP connectivity, mobility management and GSM services to the mobile phones roaming within the area that it serves. This means voice and data services, as well as SMS and call divert. The core intelligence in GSMnet™ is contained in the MSC. The following list highlights some of the functions performed by the MSC.

- Paging
- Co-ordination of call set up from all GSMnet™ mobile subscribers in its area
- Dynamic allocation of resources
- Location registration
- Interworking function with different networks
- Handover management
- Signaling exchange between different interfaces
- Gateway to Short Message Service Centre (SMSC)

- Management Station Controllers
- Operating system Linux

Home Location Register (HLR)

Within the SiRRAN GSMnet™ infrastructure is the Home Location Register (HLR) - an Oracle database that stores data related to a given set of subscribers. The HLR is a reference database for subscribers parameters, some of those parameters include:

- International Mobile Subscribers Identity (IMSI)
- Messages waiting data (used in conjunction with SMS)

When integrating with the SiRRAN Core Network or an MNO network a central GSMnet™ HLR is used as the network hub with remote GSMnet™ systems updating the central HLR and handling local registration and location information. This ensures that presence information can be shared across the entire network and real time updates are provided from the Core Network as remote GSMnet systems come on line.

Base Station Controller (BSC)

Base Station Controller (BSC) acts as a switch dynamically creating and tearing down the connections between the links serving the BTS radio channels and the MSC. It manages handovers between BTS under its control, and between itself and other BSC. Handover is required to allow calls to be made and received whilst on the move. The network must support cell-to-cell handover as the user travels across a site, and it is essential that the handover be transparent to the user. There are 2 types of handover

- Intra BSC - Device remains under the control of the same BSC but changes BTS
- Inter BSC - Device changes BSC as well as BTS

There are 4 purposes of handover

- Maintenance of high signal quality
- Recovering co-channel interference from another cell
- Traffic balancing among cells
- Recovering the failure of a control channel

Short Message Service Center (SMSC)

A Short Message Service Controller (SMSC) is a network element in the GSM telephony network which delivers SMS messages. When a text message (SMS message up to 160 characters long) is sent from one user to another user, the phone actually sends the message to the SMSC. The SMSC stores the message and then delivers it to the destination user when they are available. This is a store and forward operation. The SMSC has a configurable time limit for how long it will store the message before

removing it from the store. Messages can also be sent from PC based clients that interface into the SMSC via Short Message Peer to Peer (SMPP v3.4)

GPRS and EDGE Services

GPRS is used by all the macro mobile networks to provide data access to GSM handsets. It allows users to collect e-mails on their mobile phone and to surf the web for data. GPRS support within the GSMnet™ extends these capabilities to the mobile user within the coverage area ensuring mobile users have the same functionality on their mobile phone in the private network as they do when on the Macro network.

The GSMnet™ is able to deliver General Packet Radio Service (GPRS) services using a GPRS Support Node (GSN) with the features of a Serving GPRS Support Node (SGSN) and a Gateway GPRS Support Node (GGSN).

Integrated Switching Centre

A prerequisite for most GSMnet™ solutions, as it would be for any telecommunications service, is to establish a network interoperable switching centre where all mobile network numbers for the network can be terminated and where calls made on the mobile network can be connected into the Public Switch Telephone Network (PSTN) and calls from the PSTN can be connected to the mobile network. SiRRAN Communications has a Switching Centre within Telefonica's Network in Europe, this provides access from any remote GSMnet™ to 2.1 Billion mobile users across the globe. The core network has roaming agreements with more than 730 international telecommunications companies ensuring a truly seamless network architecture. In establishing this facility SiRRAN has provided full interoperability with legacy (TDM) and the new IP protocols (SIP) which will enable the provision of secure and future proof network infrastructure. SiRRAN Communications has the ability to provide immediate rollout capability in any location and provide edge of national network coverage to stretch the network into areas where a private network will provide resources not otherwise available.

Radio Access Network

SiRRAN work with both local GSM Operators and government agencies to provide

- Rapid Deployment/ Secure communications (Military, First Responder)
- Network Infill
- Fixed Mobile Convergence/In Building Solutions

As the conditions of spectrum usage vary from Country to Country SiRRAN has integrated with a number of different radio access technologies so that it can leverage the same core network components whilst using best in class radio access network solutions. These include Femto, Pico, Micro and Macro Cell solutions that provide coverage from 100 metres to 20 kilometers. SiRRAN specializes in providing edge of network or in-fill solutions for network operators where cost of deployment and overall solution footprint is

at a premium. These solutions can be utilized for core network functionality allowing an operator to establish itself within a market without the expense of providing a mainstream GSM solution. As the user base grows the operator can then migrate to a standard solution and still sweat the asset by moving the PMX to coverage areas of low user density such as remote rural communities.

Summary

Due to the unpredictable nature of disaster situations and the changing environment of the warfighter robust and rapidly deployable communications are a requirement. Having a solution that can be easily transported and brought into service at a moment's notice can make the difference when First Responders and Military Personnel are deployed. Where and when the next disaster, terrorist attack or emergency situation will happen is impossible to predict and hence tactical cellular systems must be malleable enough to adapt to any of these situations. SiRRAN Communications Ltd's portfolio of tactical cellular solutions will accommodate the unique requirements of both Military and the First Responder. SiRRAN leverages its unique position as a mobile network enabler with over seven hundred roaming agreements to provide an end-to-end network solutions ideal for these situations. Through the combination of the SiRRAN core network with applications that have been designed to enhance communications for teams operating across the globe, SiRRAN Communications Ltd provides the capability to deploy Secure, Integrated, Rapidly deployable solutions that have been developed specifically to enhance the effectiveness of Military Personnel and First Responders.