OSS and TMOS

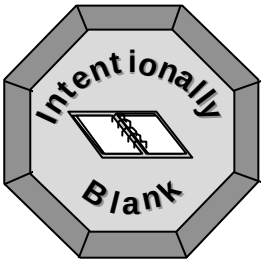
Chapter 11

This chapter is designed to provide the student with an overview of the operation and maintenance systems used in Ericsson GSM networks. The chapter describes the functions and features of OSS, TMOS, SOG and BGW.

OBJECTIVES:

Upon completion of this chapter the student will be able to:

- Describe the Telecommunications Management and Operations Support philosophy
- Describe the functions of Operations and Support System
- Describe the architecture of Operations and Support System
- Describe the implementation of the Service Order Gateway
- Describe the implementation of the Billing Gateway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11 OSS and TMOS

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INTRODUCTION

Mobile networks require an efficient and easy-to-use operation and maintenance (O&M) system because:

- Mobile networks are extremely complex
- The structure of a mobile network is often altered to allow for extension and optimization of the network
- Mobile network operators demand the reduction of O&M costs

Ericssons Operation and Support System (OSS) provides an efficient and easy-to-use O&M system.

OSS is an application within the Telecommunications Management and Operations Support (TMOS) product family.

The object of the GSM OSS is to offer the customer cost-effective support for centralized, regional, and local operational and maintenance activities required for a cellular network. The main purposes of the GSM OSS are to provide a network overview and support the maintenance activities of different operation and maintenance organizations.

TMOS

TELECOMMUNICATIONS MANAGEMENT NETWORK (TMN)

TMOS is defined as the Ericsson management and operations support solution for public telecommunications networks.

TMOS has been developed in accordance with Telecommunications Network Management (TMN) standards. The TMN standardization effort involves several organizations, such as the International Telecommunications Union (ITU), ANSI, ETSI and the International Standards Organization (ISO). TMN specifies an O&M network which is:

- Centralized
- Separate from the telecommunications network
- Connected to the telecommunications network via standardized interfaces

One of the basic principles of the TMN system architecture is the network model concept. This means that the physical network elements (NEs) such as MSCs are represented in a model of the network. Databases are used to store data about NEs.

TMOS STRUCTURE AND FUNCTIONS

TMOS consists of a “family” of management application systems for different telecom networks. For example,

- Service Management Application System (SMAS) for Intelligent Networks (IN)
- eXchange Management system (XM) for switched networks
- Cellular Management Application System (CMAS) for cellular mobile networks

All TMOS application systems are built on the TMOS PlatForm (TPF). The TPF comprises all hardware and software for interaction with a telecommunications network. The platform is a multi-computer system based on industrial standards, such as UNIX and SQL.

The TMOS Development Platform (TDP) makes it possible for the operator to create market specific functions using the C++ Application Programming Interface (API).

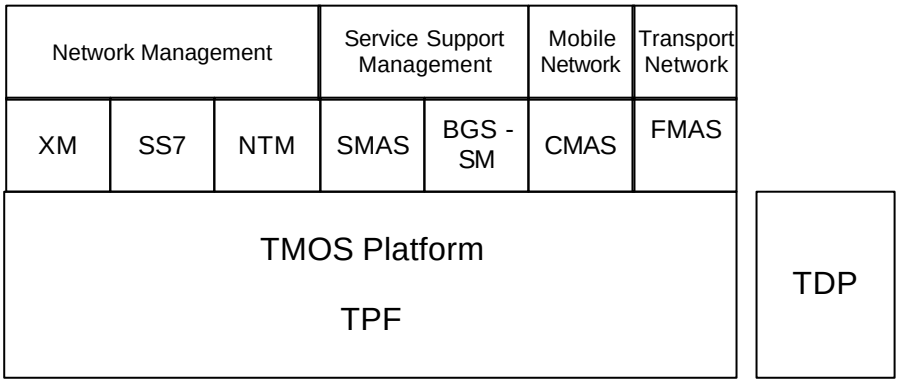


Figure 11-1 The structure of TMOS

Typically, TMOS resides in several independent computers that are connected over a Local Area Network (LAN) or Wide Area Network (WAN).

TMOS communication with the NEs is based on the Open System Interconnection (OSI) model. OSS is connected directly, or via the PSTN, to the MSCs, HLRs, BSCs and AUC/EIRs. Communication with BTSs is provided via BSCs. Additionally, other Ericsson certified nodes are supported. These include the MXE, MIN nodes and the DXX.

TMOS performs the following functions in line with TMN recommendations:

- Configuration management
- Fault management
- Performance management
- Security management
- Accounting management

ADVANTAGES OF TMOS

Input to the development of TMOS has largely consisted of demands from operators for a network maintenance system, which will give lower maintenance and personnel costs. The most significant advantages of TMOS are:

- It gives the user the ability to remotely and centrally control NEs, subscribers, traffic, etc.
- In a large network, optimal performance is impossible to achieve without a support system like TMOS
- TMOS is easy to use, employing menus, forms and graphics to interact with the operators
- New TMOS functions are continuously being developed which means that the system adapts to new and changing conditions and requirements

The XM platform consists of the following applications:

- Command Handling and WinFiol
- File Handling
- External Access
- Information Model Handler

XM-SOFTWARE, CHA AND WINFIOL

Command Handling (CHA)

Command HAndling (CHA) enables an OSS user to send Man-Machine Language (MML) commands one by one or as a block to a NE.

It is also possible to store several commands in a command file and execute the file or parts of it whenever needed.

All executed commands are logged and can be retrieved and displayed from the command log mainly for security and troubleshooting. The results of the commands can be routed to all connected user interfaces or to a file.

CHA allows OSS to be connected directly to several NEs at the same time using multiple windows. CHA windows are used with other fault management applications to act directly on incoming alarms.

Command Files

There are two types of command files:

The "Command file" which has limited functions and can be created by any user.

The "System command file" which can include more sophisticated statements and can be created by the system administrator for execution by authorized users.

In addition to the usual commands included in the basic file function, the system command file may also contain procedural control statements, wait statements, and error-handling functions.

Command and Response Log

All commands that are sent to a NE and all received responses and spontaneous reports are logged in the command and response log.

CHA provides a function for searching for and retrieving information from the command and response log. The following search criteria can be used:

NE name

Host name

User ID

NE command (part of a command can also be used)

Application information (for example command file name)

Search string for text, matching responses or spontaneous reports

Start and stop date and time

WinFIOL

WinFIOL (File transfer and on-line program for Windows) is a man-machine communications program designed for operation and maintenance, installation, testing of customer exchanges. WinFiol is now also available as a PC client in OSS.

WinFIOL includes a powerful editor for command files and log files, a script language and a macro language.

- Scheduler for command and script files
- Support for dangerous commands

SEVERAL LOGGING FUNCTIONS FOR COMMANDS AND PRINTOUTSOSS

OSS STRUCTURE AND FUNCTIONS

OSS (Operation Support System) is the product name for Ericssons O&M (Operation and Maintenance) system for cellular networks. OSS consists of Exchange Management System (XM) features and Cellular Management Application System (CMAS) features built on top of the TMOS Platform (TPF).

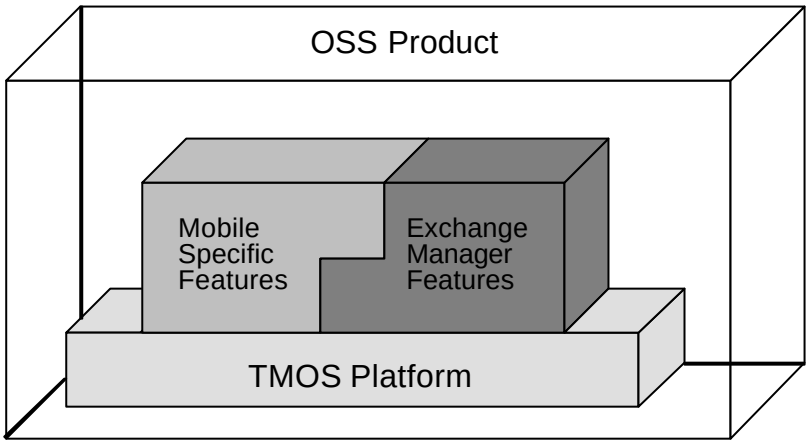


Figure 11-2 Structure of OSS

- The GSM network contains many NEs, that may be spread over a large geographical area.
- OSS enables centralized, remote controlled O&M of all NEs in a uniform and user-friendly manner.
- OSS is physically implemented on a LAN consisting of servers and workstations.
- The functions provided by the graphical user interfaces of OSS are translated into commands, which are then sent to one or several NEs.
- OSS is not one tool, rather 50 different applications used by different staff for operating the network.

Although the GSM network is complex, OSS is easy to use. OSS consists of about 50 applications that can be used to solve different tasks. It offers menus, windows and graphics with which the operators can interact. No long, complicated commands are needed to operate the system.

NMC AND OMC

According to GSM specifications, a system such as OSS can be seen as a two level management function that provides centralized control of the network. The levels are:

- Network Management Center (NMC)

NMC staff can concentrate on long-term system-wide issues,

- Operation and Maintenance Center (OMC)

OMCs concentrate on short-term regional issues.

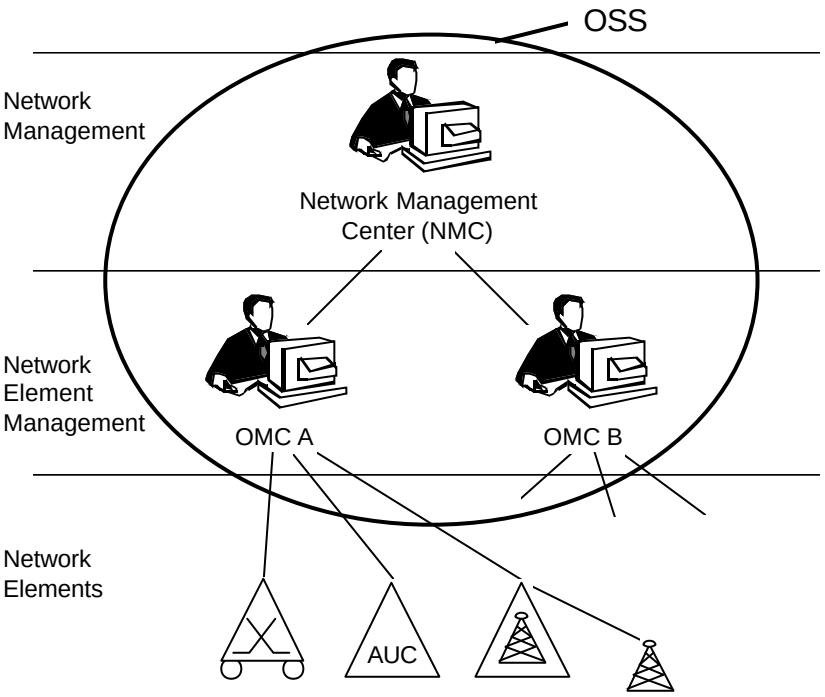


Figure 11-3 NMC and OMC

In OSS, the OMC and NMC functions can be combined in the same physical installation or implemented at different sites.

OSS APPLICATIONS

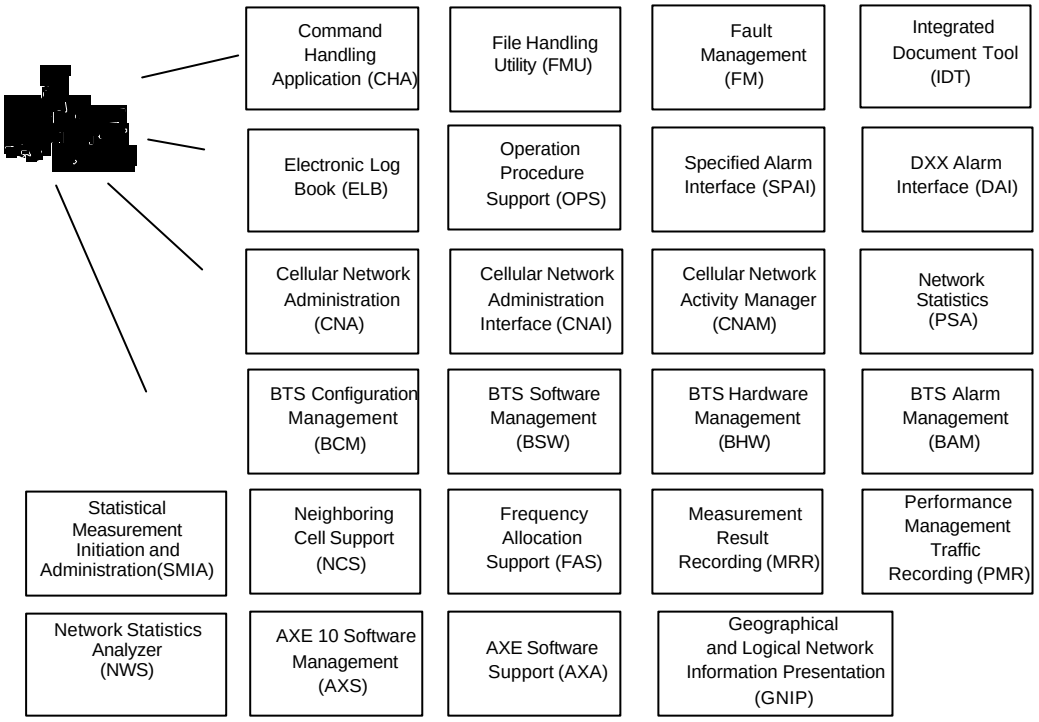


Figure 11-4 OSS applications

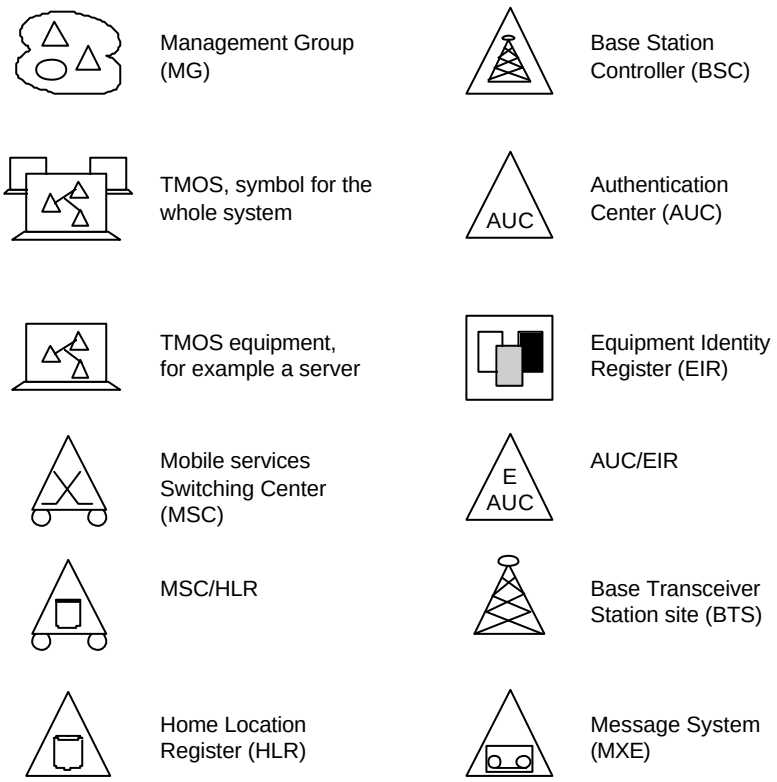


Figure 11-5 OSS symbols

Radio Network Management main features are:

- Central administration to optimize the use of skilled personnel
- Supervision of network operation for planning purposes
- Network performance measurement
- Traffic recording and analysis of measurement and event data
- Cellular network configuration
- OSS maximizes service quality in cellular networks by providing a centralized facility for network configuration, administration, performance measurement, and maintenance of the network components.

Radio Network Management is achieved through the following different applications listed below:

- Basic OSS-Node Administration (BOA)
- Cellular Network Administration (CNA)
- Cellular Network Administration Interface (CNAI)
- CNA / Move BSC
- Work Task Package (WTP)
- Radio Network Recording Functions (RNR)
- Network Statistics, Analyzer
- Network Statistics, Statistical Measurement Initiator and Administration (SMIA)
- Network Statistics, Statistical Gateway (SGw)
- Network Statistics, Statistical Data Mart (SDM)
- Network Statistics, Performance Alarms
- BTS Configuration Management (BCM)
- BTS Hardware Management (BHW)
- BTS Alarm Management (BAM)
- BTS Software Management (BSW)
- Frequency Allocation Support (FAS)
- Frequency Optimization Expert (FOX)
- Neighboring Cell Support (NCS)
- Neighboring Cell List Optimization Expert (NOX)
- Measurement Result Recording (MRR)

- Traffic Estimation Tool (TET)

THE AXE MANAGEMENT

The AXE Management provides functions to manage all AXE based Network Elements. This is done by:

- AXE Software Management (AXS)
- AXE Hardware Manager (AHW)
- AXE Software Activation Support (AXA)
- Fault Management (FM)
- AST Manager
- AXE Number Analysis Manager (NAM)
- Announcement Service Manager (ASM)

NON-AXE MANAGEMENT

Support for non-AXE Network Elements, *typically alarm handling functions*, is provided by the following applications:

- Multivendor Support (MVS)
- Sema AUC/EIR Alarm Handling (AEH)
- MXE Alarm and Command Interface (MAC)
- DXX Alarm Interface (DAI)
- Specified Alarm Interface (SPAI) (no longer sold)
- SPAI Verification Program (VERP) (no longer sold)
- Q3 Access
- Basic Network Surveillance Interface (BNSI)

Tools

The following applications are provided to make the daily operation of the network easier:

- Cellular Network Activity Manager (CNAM)
- Operations Procedure Support (OPS)
- AXE Library Explorer (ALEX)
- Geographical and Logical Network Information Presentation (GNIP)
- OMC Flashboard (OFB)

CONFIGURATION MANAGEMENT APPLICATIONS

Cellular Network Administration (CNA)

Cellular Network Administration (CNA) is an application within OSS that is used to:

- Plan and operate the cellular part of the GSM network
- Plan major future changes off-line
- Implement new cells or new parameter values in the network

CNA is one of the most powerful OSS applications. It registers new cells and maintains cell parameters in an efficient and controlled manner.

☞ Did you know?

OSS can support networks that have up to 5,000 cells. Each cell has approx. 200 parameters. Therefore, OSS can handle up to 1 million cell parameters.

In large PLMNs the amount of network data is huge. CNA provides an efficient tool for handling cell data consisting of approximately 200 parameters per cell. Most of these parameters identify the cell and control the cell behavior.

The operator can edit cell parameters and cell related parameters through a table mode, a menu mode and a geographical mode that displays cell shapes and cell parameters on top of map layers.

CNA Network Model Structure and Areas

Network structure and parameters change over time. Operators are not just interested in the current set-up, but also interested in information about previous set-ups and possible future ones. Therefore, OSS provides the following three different views of the network:

- The **valid area** represents the current cellular network. That is, it provides current information about the cell parameters in the network. There is only one valid area corresponding to each cellular network. The valid area is used when retrieving information about current network parameter values and as a basis when creating a new planned area.
- **A planned area** represents planned changes in the cellular network. This area is used for off line planning of large network changes. It is locked and connected to one user at a time.
- **A fallback area** is a snapshot of the valid area at a specific moment and reflects an historical view of the network. A fallback area can be created for back-up purposes before an update to the network takes place. It is also possible to create a new planned area from a fallback area.

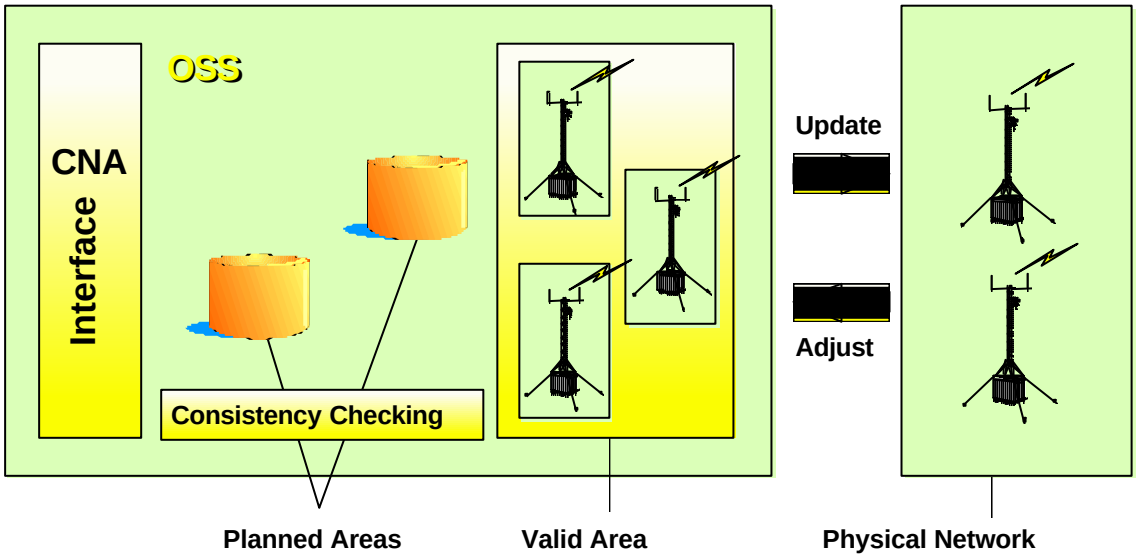


Figure 11-6 CNA area concept

Consistency check

The CNA consistency check automatically performs separate validity checks on the networks parameters. It ensures that the values of parameters are valid and that they are within predefined intervals. All parameters are checked against parameter consistency rules. The consistency check can be performed on:

- Area level (Valid and Planned Area)
- MSC
- BSC
- Cell level

A consistency report generates warnings but does not prevent a faulty value from being entered. Consistency checks can be performed on all parameters or only on new parameters.

CNA Interface (CNAI)

The Cellular Network Administration Interface (CNAI) tool serves as an import and export interface to the CNA application. It provides easy exchange of information between the OSS and an external system. For example, CNAI could be used to transfer a file of cell parameter data from the external cell planning application, TEMS, into the OSS. Otherwise, the cell parameter data from TEMS would have to be manually entered using CNA.

Geographical and Logical Network Information Presentation (GNIP)

GNIP is a common geographical and logical presentation tool, which can be utilized by several applications. It provides the possibility to show network information from several applications in one user interface simultaneously.

Alarm Status Viewer (ASV) is an information gateway from Fault Management (FM) to GNIP. Geographical Cell Configuration (GCC) is an information gateway from CNA to GNIP.

It is also possible to present recording results from FAS, NCS and MRR on the GNIP map.

The network information is displayed by means of dynamic real time symbols on top of maps or in logical views. GNIP together with ASV, GCC, FAS, NCS, MRR provides a clear and accurate view of the managed network.

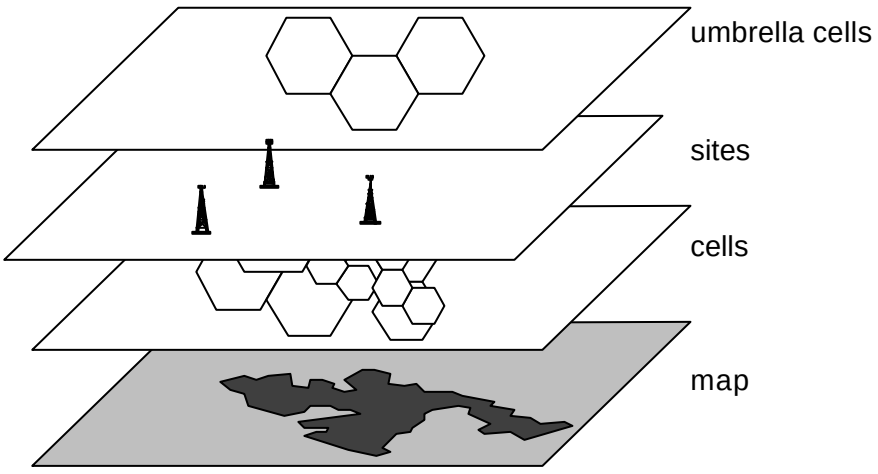


Figure 11-7 Map layer structure in GCC

BTS Management Family

The BTS Management Family application supports an operators daily BTS-related operations in the network. It can be distinguished by its use of a graphical browser which shows the internal base station structure. The concept is based on a “plug-in” approach, whereby new features can be added to the family and used in the same manner as all other features.

The graphical browser enables the operator to navigate through the BTS/Transceiver Remote Interface (TRI) managed object structure in a consistent and efficient way.

The BTS Management Family consists of:

BCM:	BTS Configuration management
BSW:	BTS SoftWare management
BHW:	BTS HardWare management
BAM:	BTS Alarm Management

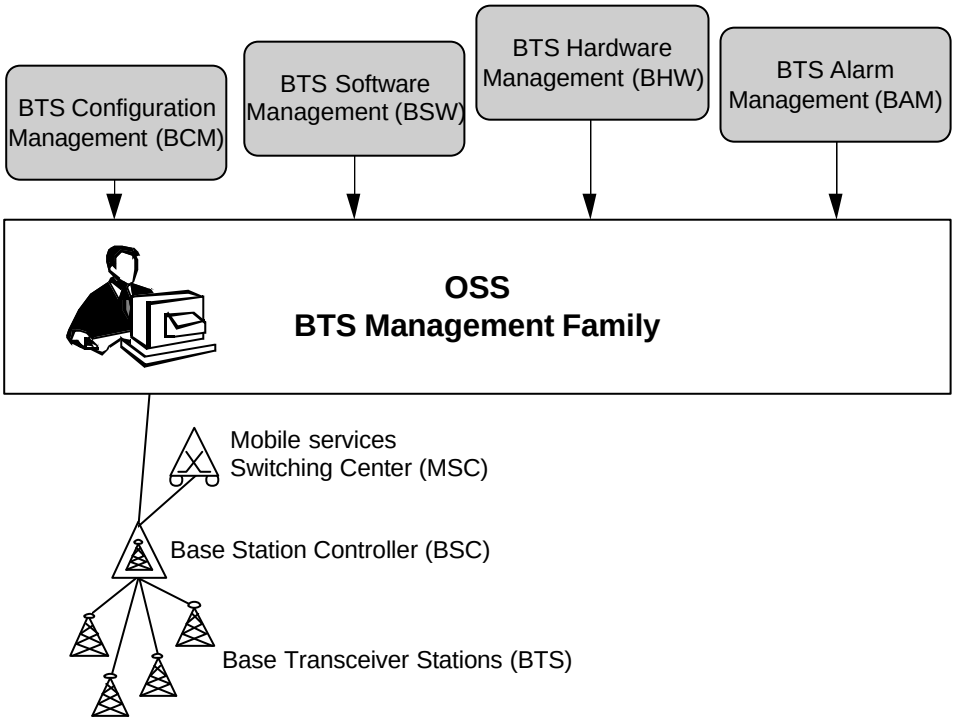


Figure 11-8 BTS Management Family

BASE STATION CONFIGURATION MANAGEMENT

The BCM application provides the network operator with an application to handle the BTS configuration. It combines functionality for the configuration of BTS parameters with support for introduction and modification of BTS.

By using the Planning Wizard the user gets support in changing BTS configurations. It makes sure that the user creates complete configurations and ensures consistency for the data planned with the Planning Wizard.

The effort to change the state of base stations can be reduced by using the state changing functions in BCM. The functions work on different Managed Objects (MO) levels and include commands and scripts for blocking/deblocking as well as for in service/out of service operations.

BASE STATION HARDWARE MANAGEMENT

The BHW application provides the operator with a hardware register of the installed BTS Replacement Units (RU).

By using the BHW application, the user can easily identify RUs, their revisions and serial numbers installed on a site.

BASE STATION ALARM MANAGEMENT

The BAM application provides the user with a functionality to restrict the amount of alarms and to define which kind of alarms to be presented. This feature is enables the user to filter alarms according to certain criteria, which depend on the current situation, and makes it easier to concentrate on important alarms. BAM offers the possibility of viewing the complete suppressed alarm information.

Furthermore, BAM provides the user with a more efficient faultfinding process by presenting interpreted fault and status information on the BTS managed objects.

External Alarm Objects for RBS can be configured as well as re-configured. The user can retrieve as well as reset the BSCs Error Log for the Managed Objects (MOs).

BASE STATION SOFTWARE MANAGEMENT

The BSW application contains functions to handle BTS software Central function (CF) software or Transceiver (TRX) software, depending on the type of BTS) in a centralized way. It includes functions to show an overview of the software status in the CF or TRX, to copy CF or TRX software packages into OSS storage, to view the stored software packages and to load stored packages down to the CF or TRX.

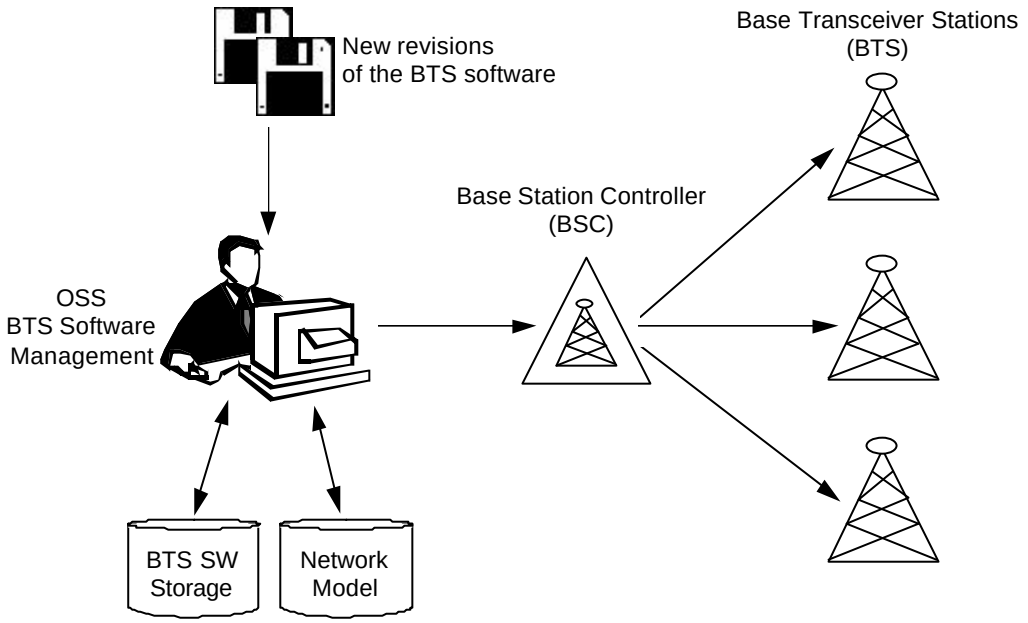


Figure 11-9 BTS Software Management

Separation of BTS Software Download and Upgrade

This feature enables the operator to perform a BTS software upgrade in two steps by introducing the possibility to separate the software download and upgrade. By using this feature the operator is able to perform software download during busy times and only start the new software at quiet times, e.g. at night..

The key points of the feature are:

- Simplify BTS software upgrade
- Different command interfaces to:

- Download BTS software
- Start (upgrade) the downloaded BTS software
- Backward compatible

There is a new observation alarm when software is loaded but not started. This alarm will cease when all managed objects are started.

AXE Software management (AXS)

The AXE Software management (AXS) application provides the operator with a set of administrative tools for loading and handling software revisions in Ericssons AXE based NEs (HLR, MSC, TRC and BSC) in a centralized manner. AXS uses a browser similar to the BTS family browser to present different NEs. A database used for storing information about software gives the operator a good overview of the software revisions in the NEs.

The major functions of AXS are to:

- Review the software revisions in order to maintain consistency between NEs
- Download new or updated software to different exchanges
- Upload software units and program corrections

Automatic Correction Deployment (ACD)

Automatic Correction Deloyment supports the update of the network in an efficient way with identical software installled in all AXE based network elements. With ACD the correction handling process of the network elements like BSC, MSC and HLR is automated. There are no impacts on hardware.

The major functions of ACD :

- Distribution mechanism which can be automated and which allows the copying of packages from the correction package repository
- Package installation in the network elements
- Display of installation status
- Display of software records

ACD requires OSS features OPS and AXS.

AXE Hardware Management (AHW)

AXE 10 Hardware Manager (AHW) provides the operator with an adjustable register of the installed AXE hardware. AHW contains functionality to support the task of keeping track of hardware installed on the AXE sites, and keeps information up to date. With AHW the hardware register can be adjusted online to the latest available hardware information from all AXEs equipped with BYB501 or later versions (this includes AXE 810). Operators get a cost efficient way of collecting AXE hardware information, and the information can be kept up-to-date at all times.

OPERATION AND MAINTENANCE FEATURES

Remote Function Change

The remote function change feature introduces a radically new way to upgrade software. Instead of sending a rollout team on-site to upgrade the software by following an implementation procedure described on paper, the upgrade team can now sit at the OMC site and supervise the execution of a software program that remotely upgrades the software in the target exchange.

Using OSS applications, an upgrade team can supervise the remote upgrade of at least 30 exchanges in parallel from one OSS terminal. This results in a substantial increase in rollout speed over the traditional on-site upgrade procedure.

The upgrade procedure is performed using software scripts. The OSS plays a key role. The upgrade is monitored and controlled by the OSS application Software Management Organizer (SMO). The software scripts are executed on an OPS (Operation Procedure Support) application. A third application, AXE Software Management Module (ASM), is used for file transfer from the OMC to the IOG.

This feature is used together with the OSS feature SMO, OPS, ASM and ACD for increased operator benefit.

Easy Handling of Managed Objects

This feature is intended to be used by OSS to speed up the O&M operations in a BSS system.

This feature makes it possible to handle MOs and associated sub-ordinate MOs with only one command. MOs that are supported are: TG (Transceiver Group), CF/TGC (Central Function/ Transceiver Group Function), TRXC (Transceiver Controller) and all associated sub-ordinate MOs. The events supported are, taking these MOs into/out of service and blocking/deblocking. This feature is invoked by adding a parameter to existing commands. There is also an option to leave this parameter out if the feature is not required.

Real Time Event Data

The Real Time Event Data features will provide access to radio network events on a real time basis. The feature together with the OSS feature, Real Time Performance Monitoring (R-PMO), will provide an effective and user friendly way of monitoring network performance in real time from the OMC site. The feature complements the already existing possibilities of performance measurements and recordings in the BSC and OSS.

The feature introduces a reporting mechanism in the BSC that provides information about events in the radio network, i.e. event data, on a real time basis. The event data is time stamped, which makes it possible to monitor the speech quality immediately before and after a parameter change has been introduced. The feature complements the already existing performance measurement and recording functions in the BSC and OSS, by providing faster access to event data.

At the OSS site, the operator can view the event data in graphs and tables, print and save it by using R-PMO functions. Performance warnings can also be set in the OSS to monitor network disturbances. By using the feature, feedback from radio network design and optimization activities are available instantly.

FAULT MANAGEMENT APPLICATIONS

Fault Management is collecting alarms and is connected all NEs (Network Elements) that it is necessary to supervise and where to take action on alarms. Available tools within OSS fault management are described in the following text.

NETWORK ALARM STATUS PRESENTATION/ALARM STATUS VIEWER

A common operator task is to supervise the network alarm status and to act upon incoming alarms. All alarms, from OSS itself, AXE nodes, RBSs aswell as external fire-, water- or intruder alarm can be routed to OSS. Alarms from NEs will be forwarded to OSS if the alarms in the NE are defined to be routed to the OSS and if the alarms are defined in the OSS as expected output from the NE.

Depending on alarm severity and operator defined parameters, an alarm bell can be activated. It is also possible to filter alarms so that only certain alarms are presented. The alarms are presented on a graphical map of the operating area, called Network Status Presentation (NSP). The alarms are displayed next to the affected NE. Different symbols are used to depict different alarm-categories:

Alarm severity	**When to take action**
Critical	Action must be taken immediately
Major	Action must be taken as soon as possible
Minor	Action should be taken when there is time, or the situation should be observed
Warning	Take corrective action during routine maintenance
Indeterminate	An alarm has been generated for which there is no alarm severity defined in the system

FAULT MANAGEMENT

Fault Management is the all-inclusive name for the different alarm-handling functions (Alarm Handling). Events reported from Nes, as well as datalink faults, external alarms and OSS internal errors are processed and distributed to the following end-user services:

- Alarm Viewer
- Alarm Status Viewer

The user can view the alarms with the Alarm Viewer, which consists of three applications with graphical user interfaces: the Alarm List Viewer, the Alarm Log Browser and the Alarm Status Matrix. Commands for searching alarms are also available.

With Alarm List Viewer, the user can view details of the current alarms, and also handle these alarms.

With the Alarm Log Browser, the user can search for specific alarms in the alarm log and view details and statistics of these alarms.

With the Alarm Status Matrix, the user can overview the current alarm situation in the network in a compressed view.

The Alarm Status Viewer presents the current alarm in the Geographical and Logical Network Information Presentation (GNIP) framework, which provides maps showing each supervised object at its geographical position and views showing the logical relation between supervised objects also.

The Alarm Viewer and the Alarm Status Viewer can also be displayed by a Windows NT workstation, but the main process is still executed in the Unix server.

An important feature of Alarm Handling is the capability of other Operations Support Systems to subscribe to specific alarms handled by OSS.

Alarm Handling has features for:

- Mapping of AXE alarms to a normalized alarm-record format
- Indication of equipment within the NE
- Surveillance of the AXE heartbeat signal
- Surveillance of the datalinks used for communication with the NEs

When recovery has been achieved from a heartbeat or datalink failure, it is possible to perform alarm synchronization by updating the Alarm List through a new collection of alarm lists from the affected NEs.

Alarm Handling uses the Network Model in OSS, in which each NE and its related alarm status is regarded as a managed object with associated attributes. For practical reasons in facilitating network surveillance, it is possible to form logical groups of NEs into so-called MGs (Management Groups).

Alarm Handling is designed according to the ANSI draft standards, which means that NEs following applicable parts of these standards can be supervised.

For AXE this means that the alarm classes are converted into five perceived severity values: Critical, Major, Minor, Warning, and Indeterminate. The AXE alarm categories are converted to probable cause values, for example, Processor, Subscriber lines, Power etc.

The complete original alarm information can always be found in the Alarm List and the Alarm Log.

PERFORMANCE MANAGEMENT APPLICATIONS

Some performance management functions within OSS:

- Network Statistics, Statistical Measurement Initiator and Administration (SMIA)
- Network Statistics Analyzer (NWS)
- Performance Management Traffic Recording (PMR)
- Measurement Results Recording (MRR)
- Frequency Allocation Support (FAS)
- Neighboring Cell Selection and handling (NCS)

Statistical Measurement Initiator and Administration (SMIA)

The SMIA application is used to administer, create, modify and delete statistical measurements in different AXE NEs supported by the GSM OSS. The application will support the statistical measurement functions for all Object Types in Statistic and the Traffic measurement Subsystem (STS) and the following measurements in the Operation and Maintenance Subsystem (OMS).

- Traffic Measurement on Routes (TRAR)
- Traffic Measurement on Traffic Types (TRART)
- Traffic Dispersion Measurement (TRDIP)

The SMIA provides Graphical User Interface (GUI) for the administration of the STS and the OMS measurements. The GUI runs on a Java-enabled Web browser.

OMS collects statistics about traffic on routes, distinguishes between traffic types and checks the dispersion of traffic between different routes.

STS collects statistics concerning the network capacity using different types of counters. These results are used for early detection of needs and planning for future improvements. All object types within STS are supported for measurement.

Network Statistics Analyzer (NWS)

NWS is a set of reports developed with Ericssons expertise in network planning and engineering. The reports focus on presenting data used for managing, planning, and engineering a cellular network. The reports are divided into three categories, giving different target groups reports especially designed for their needs:

- Management reports
- Planning and engineering reports
- Operation reports

PERFORMANCE MANAGEMENT TRAFFIC RECORDING (PMR)

PMR provides detailed performance analysis of the radio network. The observed performance is related to traffic behavior, such as setup of connections, handovers, and increased rate of dropped calls.

PMR provides support for the following Radio Network Recording (RNR) functions:

- **Mobile Traffic Recording (MTR):** This provides measurement reports for identified MSs (up to 64). This gives the operator the possibility to trace certain MSs to identify the causes of problems. It can also be used to study network behavior in different situations by tracing measurements from test mobiles. PMR takes short-term measurements on individual IMSIs.

- **Cell Traffic Recording (CTR):** This gives the operator the possibility to study the network behavior in certain cells by tracing measurements from up to 16 cells at the same time.

- **Channel Event Recording (CER):** The performance of channel allocation functions in the BSC can be studied, and improvements can be identified to increase the capacity and quality of the network.

Mobile Results Recording (MRR)

Mobile Results Recording (MRR) is a graphical tool which supports the supervision of network performance and trouble shooting by enabling the recording of radio characteristics such as:

- Uplink/downlink signal strength
- Uplink/downlink path loss
- Power level used by MS

Frequency Allocation Support (FAS)

The interference level in GSM networks has to be kept to a minimum in order to achieve a high speech quality. Due to increased network complexity, it is difficult to perform frequency planning to increase the capacity without increasing interference levels. Frequency Allocation Support (FAS) is a tool that supports the operator in performing efficient frequency planning so that tighter frequency re-use and less interference levels in the network can be achieved.

The operator can order FAS to perform recordings of the interference levels on up to 150 frequencies in up to 2,000 cells handled by one OSS. Once the recording is complete, the result values are reported to OSS where they are processed and presented to the operator in tabular form or graphically on a map.

Neighboring Cell Support (NCS)

Handover between cells have to be based on reliable and accurate measurements to keep speech quality high, even near cell borders.

For each cell the operator has to define a list of neighboring cells (BA-list). The MS will measure on these defined neighboring cells and deliver the measurements to the BSC, where an evaluation of the measurements can be made in order to make handover decisions.

Due to the increased complexity of the radio network, it is more difficult to define an optimal list that includes all possible handover cell candidates. Neighboring Cell Support (NCS) supports the operator with this task.

NETWORK MANAGEMENT SOLUTION (NMS)

Ericssons NMS is an open solution based on existing standards and is designed for flexibility and scalability. It is a fundamental platform for future expansion in network size, capacity and services. The solution efficiently supports and at the same time provides the flexibility needed to handle organizational demands or new service demands.

The NMS solution is based on Ericsson Telecom Management Application Framework. An important strategic concept is to build management solutions of modular components that in themselves are world-class and best-of-breed product applications. Solutions built from pre-integrated components to a verified working management solution will significantly decrease the implementation time in the operators network.

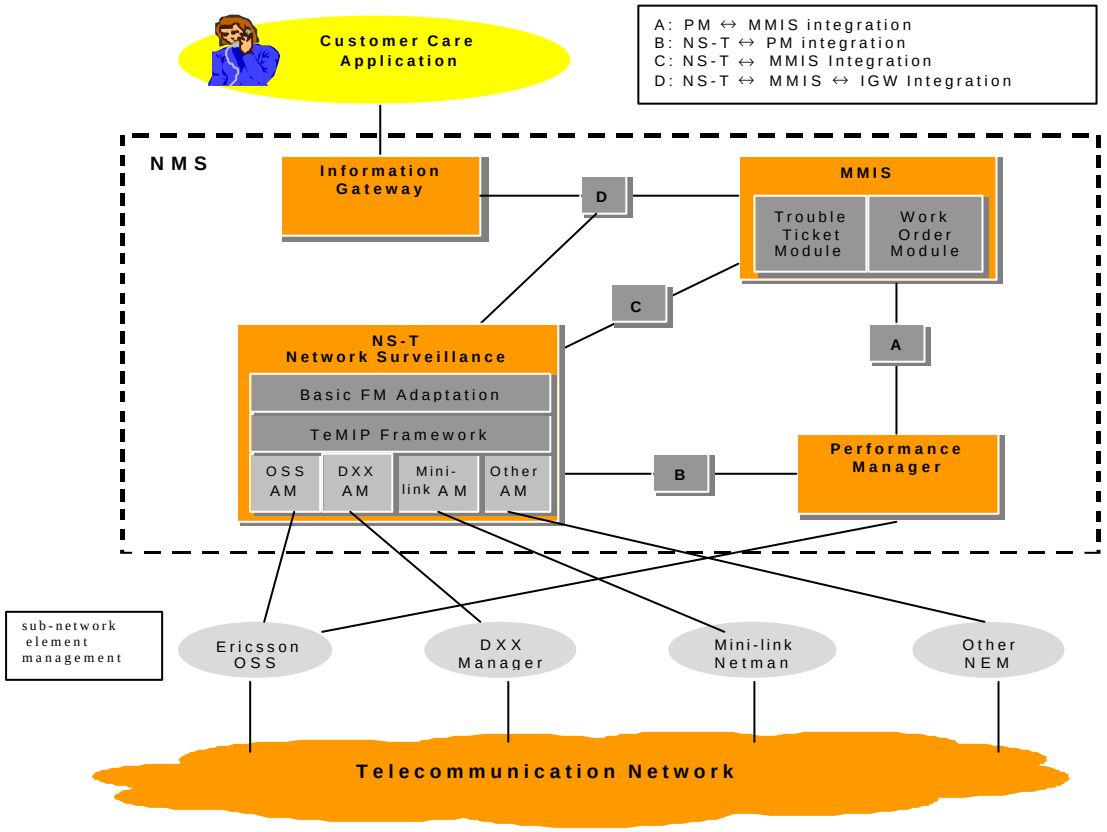


Figure 11-10 NMS Structure

MULTI-VENDOR SUPPORT

The NMS is designed for managing network components supplied by both Ericsson and other vendors. This is made possible through the implementation of Integration Reference Points (IRPs), allowing interoperability with OSS or other external application systems and access to other vendors' infrastructure components.

NMS makes use of open and standard interfaces and protocols ensuring compatibility with current and future application systems supplied by other vendors. It gives to the operator a single point of access to all components included in the network. NMS is also flexible when it comes to adaptation to network elements and other management systems and changes in the network model

At the network level, the solution consists of the Ericsson NMS application family. The solution consists of generic applications for handling management issues on a network level. These applications are integrated technically and administratively, which allows for centralizing tasks where they need to be centralized.

MAIN APPLICATIONS IN THE NMS:

- Network Surveillance : NS-T (Network Surveillance TeMIP, with added-value and integration products). The Network Surveillance architecture is fully consistent with the TMN functional architecture and provides an open and distributed implementation.
- Performance Manager : PM (Metrica/NPR, with added value and integration products)
- Maintenance management : MMIS (Remedy/ARS, with trouble ticketing and work-order management applications, added-value and integration products)
- Asset Manager
- IGW (Information Gateway)
- Network Traffic Manager
- Service Manager
- Decision support

SERVICE ORDER GATEWAY (SOG)

SOG FUNCTIONS

☞ Did you know?

One of Ericssons SOGs is capable of handling networks with up to 750,000 subscribers and can add up to 100,000 new subscriptions each day.

A network operator requires administrative systems to analyze and manage network information such as customer subscriptions, billing information and for fraud detection. An operators administrative systems are normally called Customer Administration Systems (CAS). They are often complex systems that are inflexible and costly to adapt to the specific needs of individual network operators.

The Service Order Gateway (SOG) is an Ericsson product that enables CASs to exchange information with network elements such as the HLR, which contains service information.

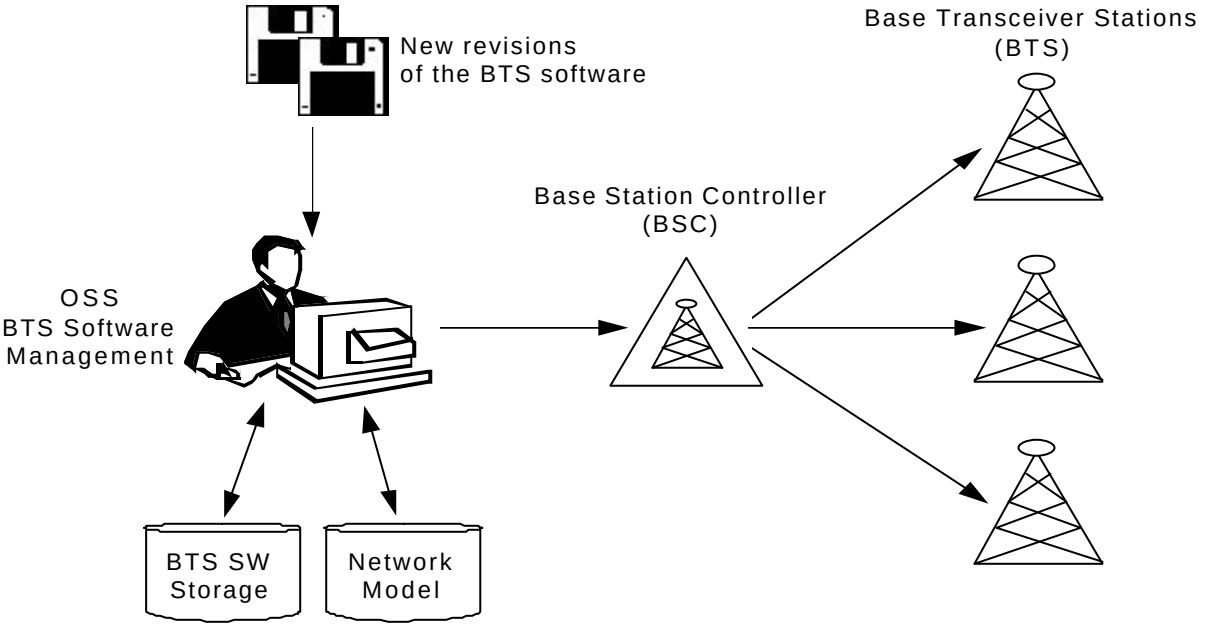
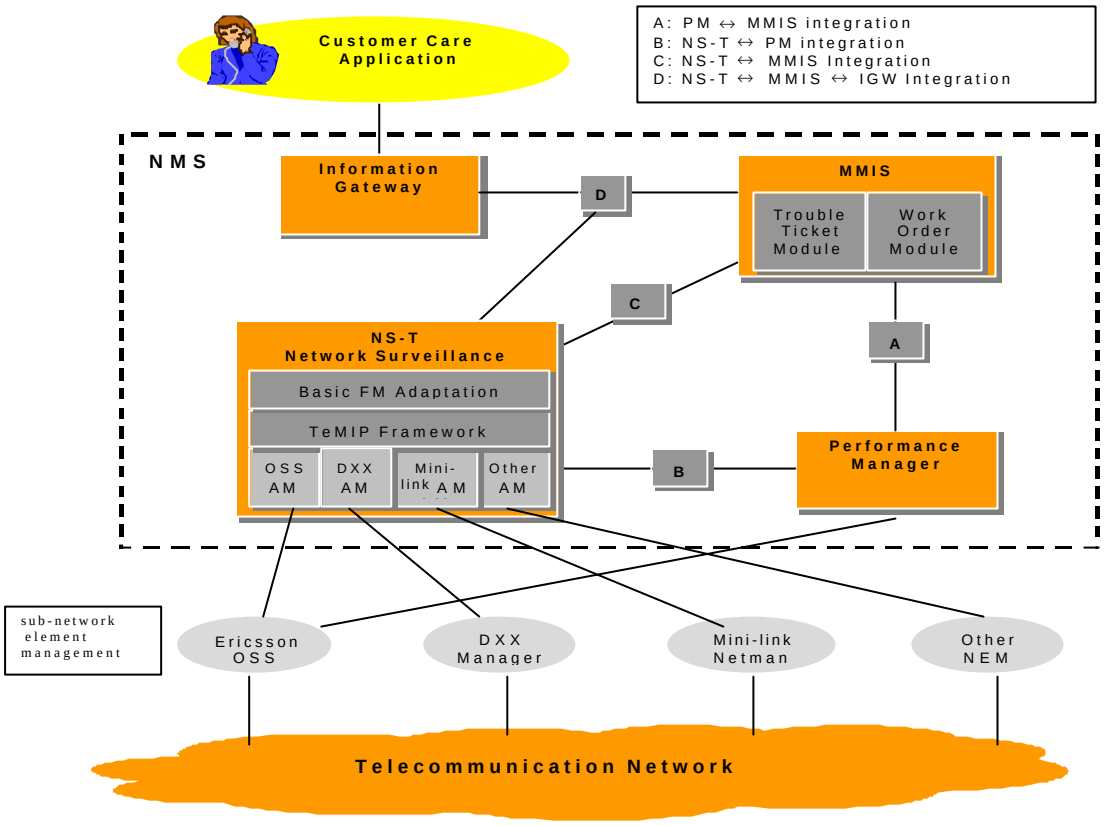


Figure 11-11 Service Order Gateway (SOG)

SOG IMPLEMENTATION

In Ericssons GSM systems the SOG is Unix-based. It contains a user-friendly GUI to enable access to the required network nodes and CASs. It can be connected to a maximum of 8 different CASs. For operation and maintenance of the SOG, it can be connected to OSS.



BILLING GATEWAY (BGW)

BGW FUNCTIONS

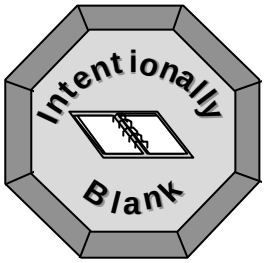
A Billing GateWay (BGW) collects billing information or Call Data Record (CDR) files from network elements such as MSCs and forwards them to post-processing systems that use the files as input. A BGW acts as a billing interface to the network elements in any network and its flexible interface supports adaptation to any new types of network elements.

A BGW is usually connected to the customer administration and billing systems and is handled by the administrative organization. The figure below shows some of the possible billing information required when analyzing a specific call.

BGW IMPLEMENTATION

In Ericssons GSM systems the BGW is implemented using Unix. Like the SOG, it contains a GUI enabling simple management of the

billing information. It can also be connected to OSS for operation and maintenance purposes.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