2G and 3G Overview

Presented by
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Course objectives.

We will cover the basic network architecture.

Look at the abbreviations commonly used.

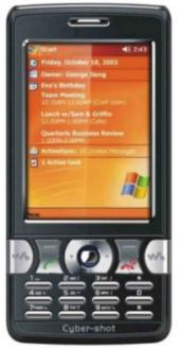
Discuss skill sets for personnel.

2G - Second generation mobile phone networks

2G is also known as GSM

GSM stands for Global System for Mobile communication

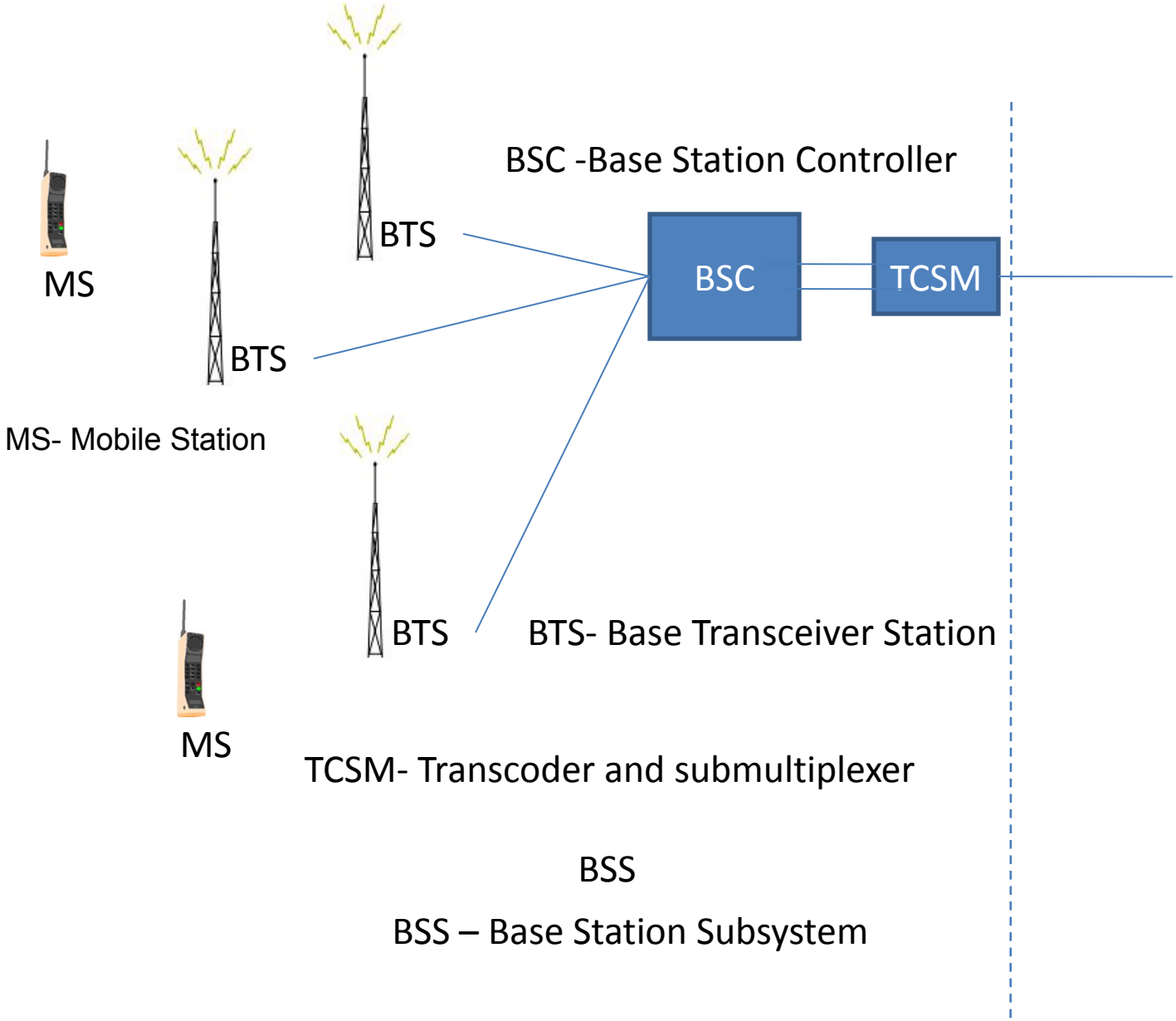
BSS - Base Station Subsystem.



MS - Mobile Station.

BTS - Base Transceiver Station.

BSC - Base Station Controller.


BSC -Base Station Controller
BTS
BSC
TCSM
MS
BTS
MS- Mobile Station
BTS
BTS- Base Transceiver Station
MS
TCSM- Transcoder and submultiplexer
BSS
BSS – Base Station Subsystem

BSS Basic functions.

MS - Mobile Station - Converts speech to a digital format and transmits this to the BTS via the air interface in the form of radio waves.

Receives radio waves from the BTS and converts the digital format to speech.

Monitors the quality and level of the radio waves from the BTS, and reports these back, so the BSC can decide if the MS needs to receive from another BTS.

Encrypts the radio signals, so the call cannot be listened to by people with scanners.

BSS Basic functions.

BTS -Base Transceiver Station-

Receives radio waves and converts them to another digital format, to transmit to the BSC.

Takes the digital signals from the BSC and converts them to radio waves, which are transmitted to the MS.

Monitors quality and levels of the radio waves and reports to the BSC, so the BSC can decide if the MS needs to receive from another BTS.

Holds configuration and software for itself.

Reports alarms back to BSC

Has an interface for staff to configure the BTS and monitor it.

BSS Basic functions.

BSC -Base Station Controller - Sends and receives calls for all its BTS's back to the rest of the network, controls the call functions.

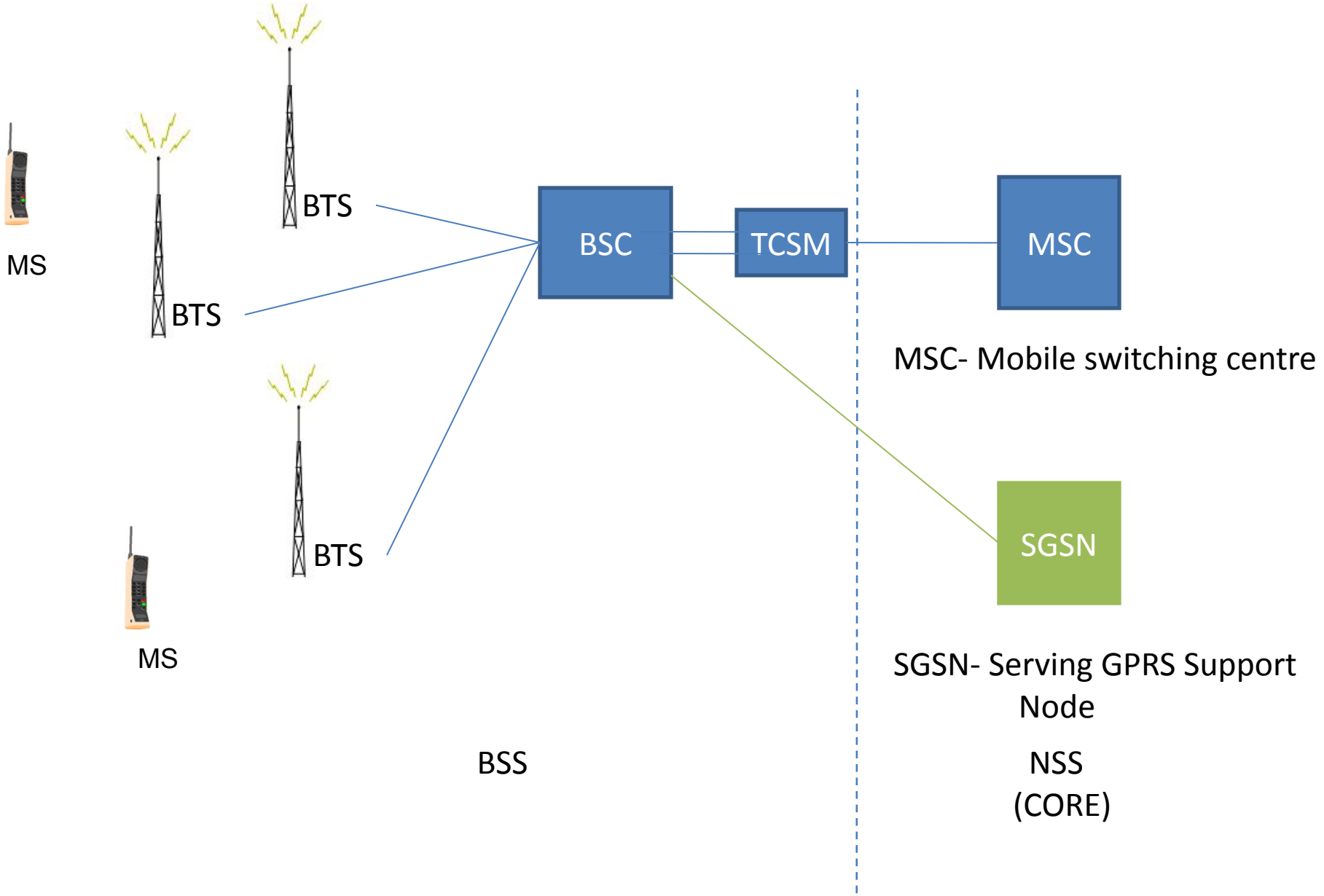
Monitors the levels and quality of all the BTS and MS reports, and controls the handovers of all the MS in it's area.

Holds configuration and software for itself, and all the BTS's attached to it. It also holds backups of these.

Takes alarms for itself and all the BTS's attached to it and passes them to the monitoring systems.

Takes the performance data of itself and all the BTS's attached to it and passes this back to the monitoring system.

Provides an interface where staff can change the configuration software and features of the BSC and the BTS's.


MS
BTS
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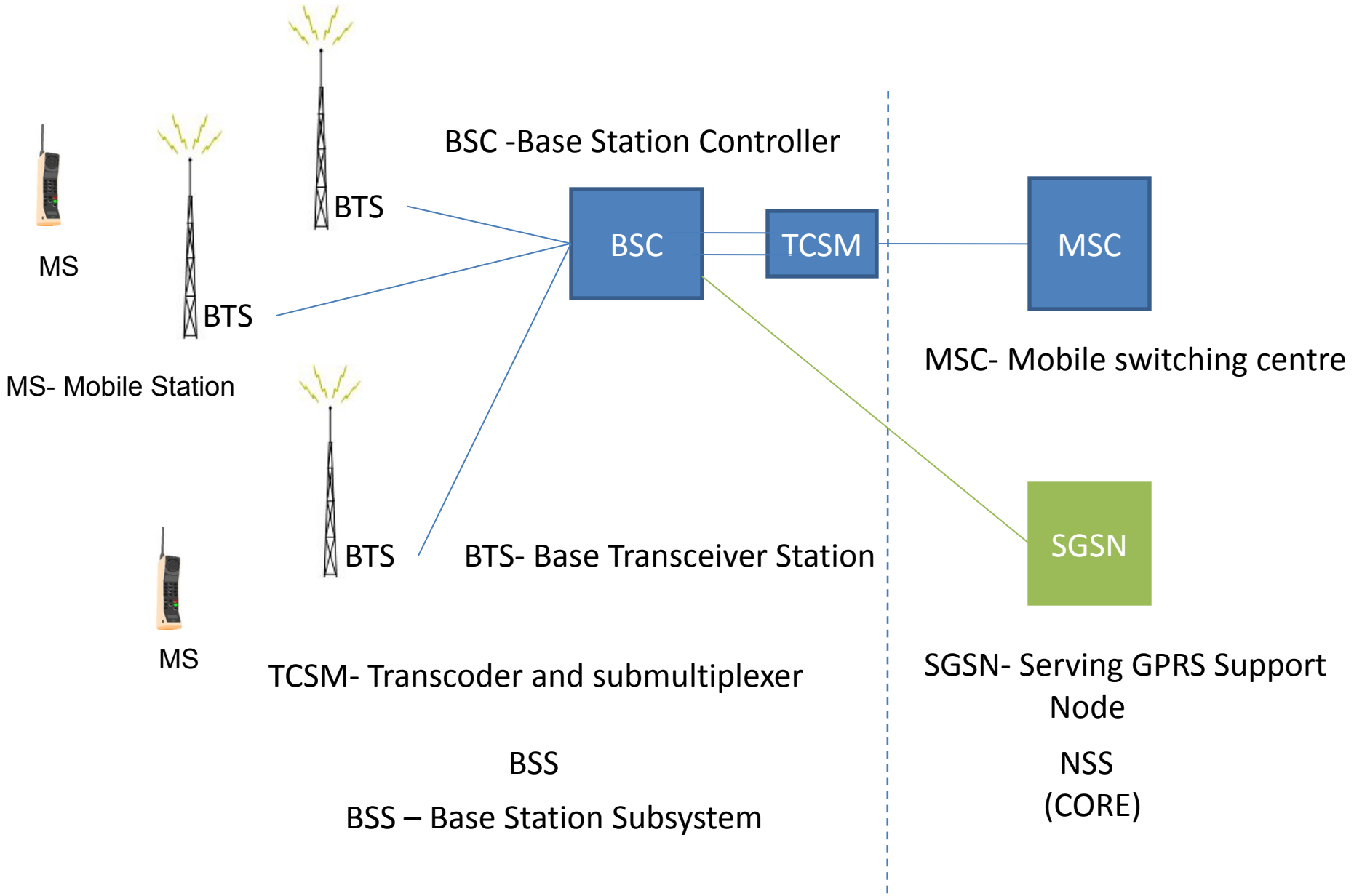
BSC
TCSM
MSC
MSC- Mobile switching centre
SGSN
SGSN- Serving GPRS Support Node
BSS
NSS
(CORE)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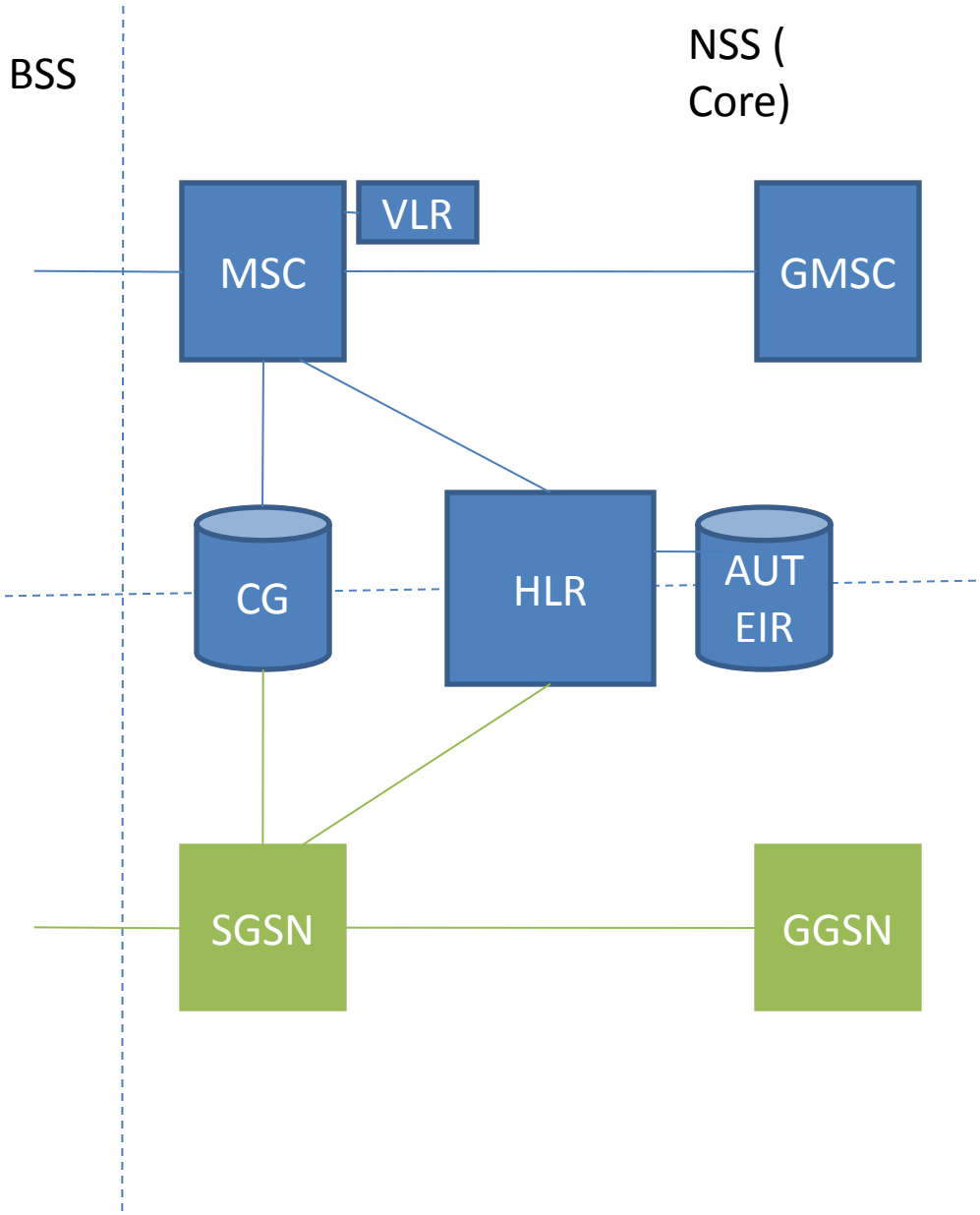
NSS - Network Sub System

Core Network



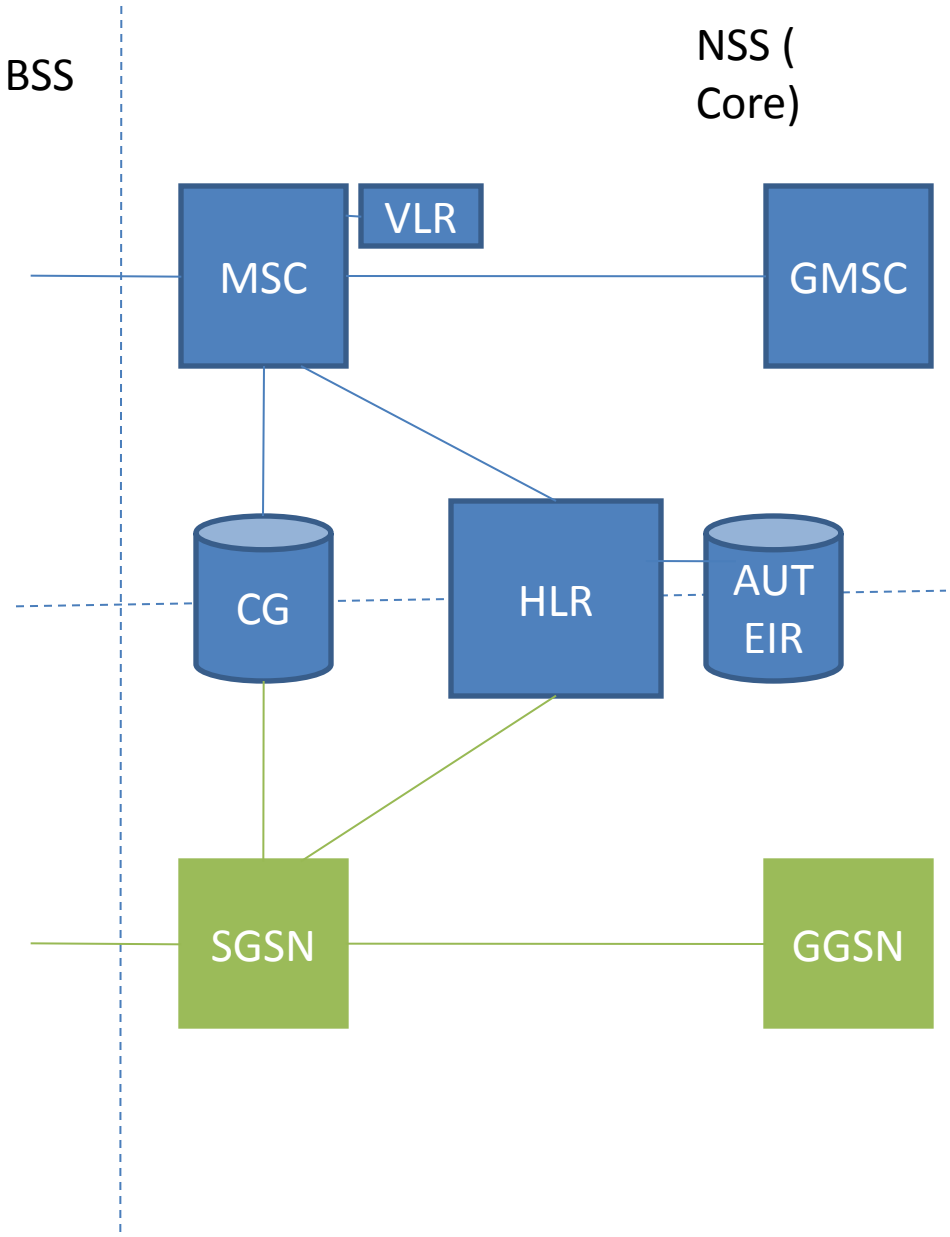
MSC- Mobile Switching Centre
GMSC - Gateway MSC

VLR- Visitor Location Register
HLR- Home Location Register

AUT- Authentication Centre
EIR- Equipment Identity Register

CG- Charging Gateway

SGSN- Serving GPRS support Node
GGSN- Gateway GPRS Support Node



CS Core- Circuit Switched Core. Speech.

HLR,VLR,AUT,EIR- Databases for call setup.
CG- Charging Gateway, Billing.

PS Core- Packet Switched Core.
Data- Web or Email.

NSS Basic functions.

CS Core

MSS- Mobile Switching Centre -	Holds limited information about the BSC's and BTS's attached to it. Has it’s own configuration and backups.
	Translates the dialled numbers and routes them to the correct GMSC or other switch.
	Controls part of call setup, contacts HLR and controls handovers when other Macs are involved
	Passes alarms for itself back to the monitoring system.
	Passes performance data for itself back to monitoring system
	Generates charging data and passes this to CG.
VLR- Visitor Location Register -	Database for MS in MSC area with information about what feature those MS’s have.
GMSC- Gateway MSC -	Connects network to other providers systems. Translates dialled digits if required.

NSS Basic functions.

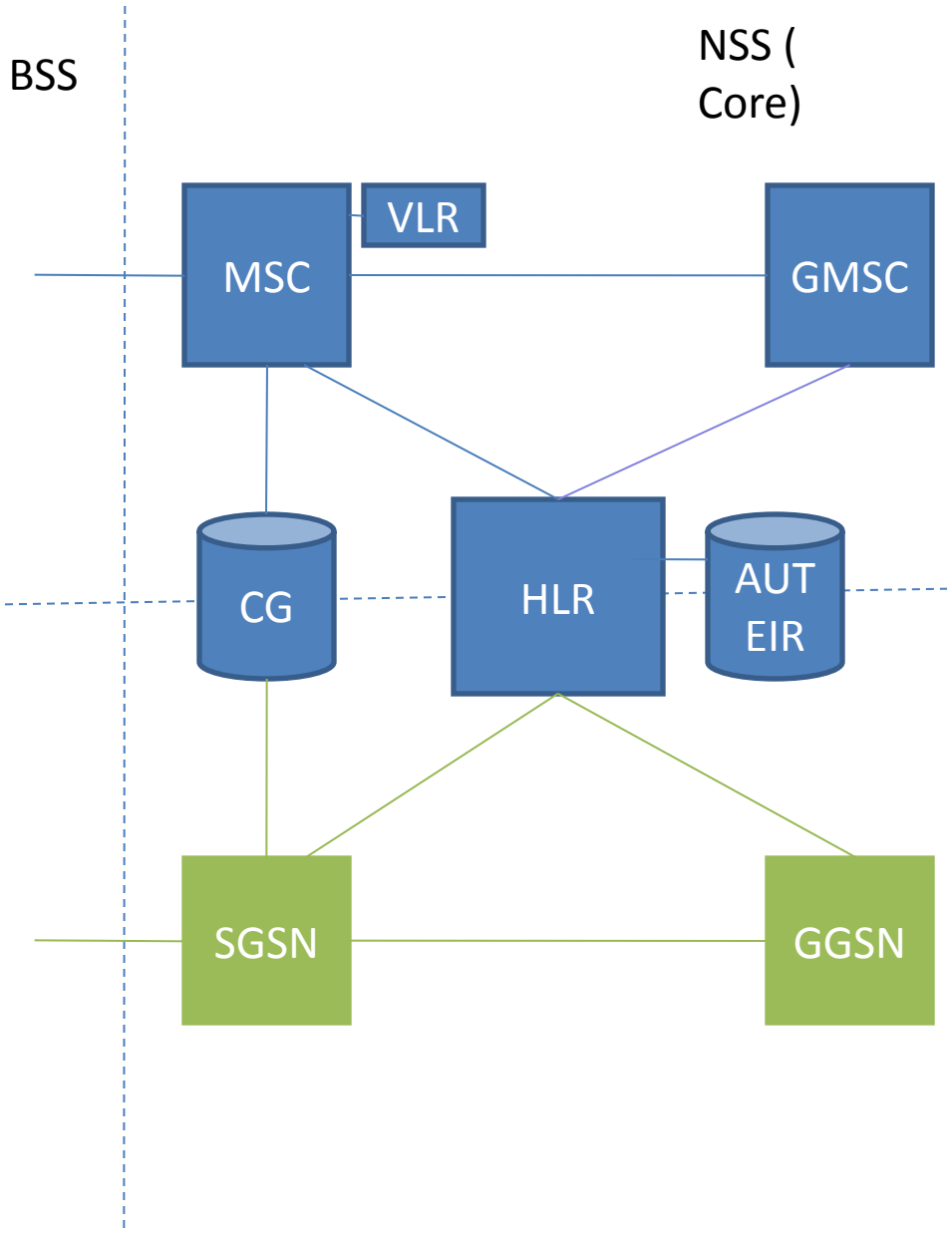
PS Core

SGSN- Serving GPRS Support Node -	Controls and keeps track of those MS using data, to route data packages to the correct BSC and BTS.
	Generates charging data and passes it to the CG
	Reports alarms and performance back to monitoring system.
	Stores it's own configuration and backups.
	Has interface for staff to monitor and configure node.
GGSN-Gateway GPRS Support Node-	Acts as a router between the mobile network and other networks such as the internet.
	Performs routing of data packets to correct SGSN and MS allowing MS to move between SGSNs.
	Converts addresses used in the mobile network to those used outside and vice versa
	Reports alarms and performance back to monitoring system.
	Has own configuration and backups.
	Has interface for staff to monitor and configure node.

NSS Basic functions.

Other elements

HLR- Home Location Register -	Database of MS and the features and functions they poses.
	Database of the current locations and states of the MS
	Stores it's own configuration and backups.
	Has interface for staff to monitor and configure node.
AUT- Authentication Centre -	With MS encrypts the radio interface
	Stores it's own configuration and backups.
	Has interface for staff to monitor and configure node.
EIR- Equipment Identity Register -	Holds the white, grey and black list for Mobile Stations
CH- Charging Gateway -	Provides interface to billing platforms with backup for records.



MSC- Mobile _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

GMSC - _ _ _ _ _ _ MSC

VLR- V_ _ _ _ _ _ Location Register

HLR- H_ _ _ Location Register

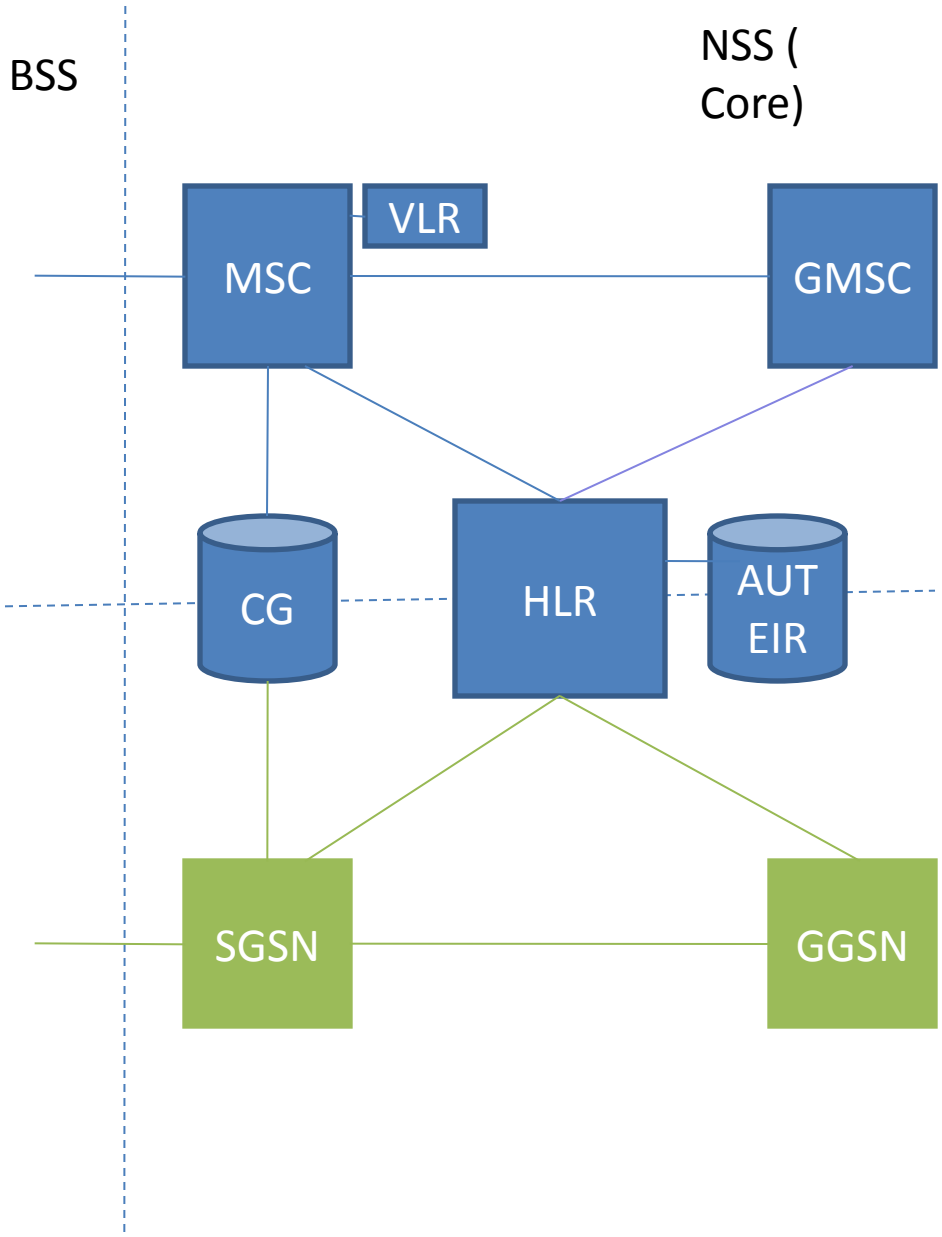
AUT- A_ _ _ _ _ _ _ _ _ _ _ Centre

EIR-Equipment _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

CG- C_ _ _ _ _ _ _Gateway

SGSN- S_ _ _ _ _ _ _ _ _ _ Support Node

GGSN- G _ _ _ _ _ _ _ _ _ _ Support Node



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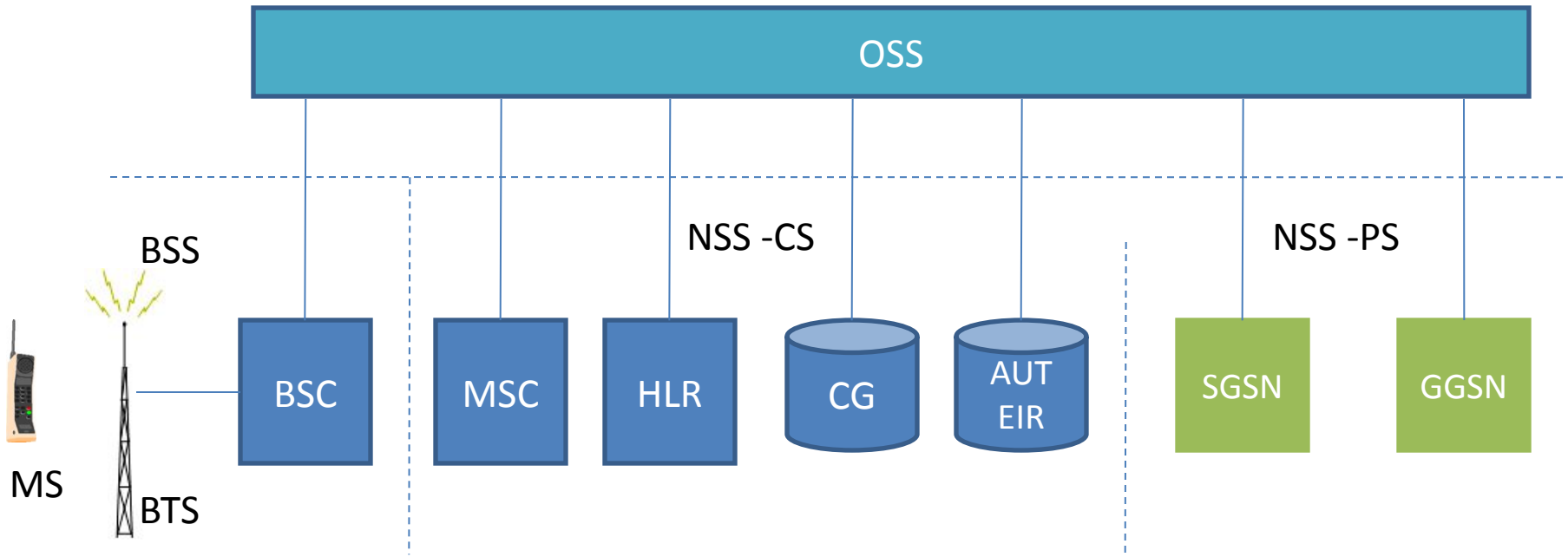
OSS- Operational Support System

Alarms
Configuration and Control
Performance
Network backup



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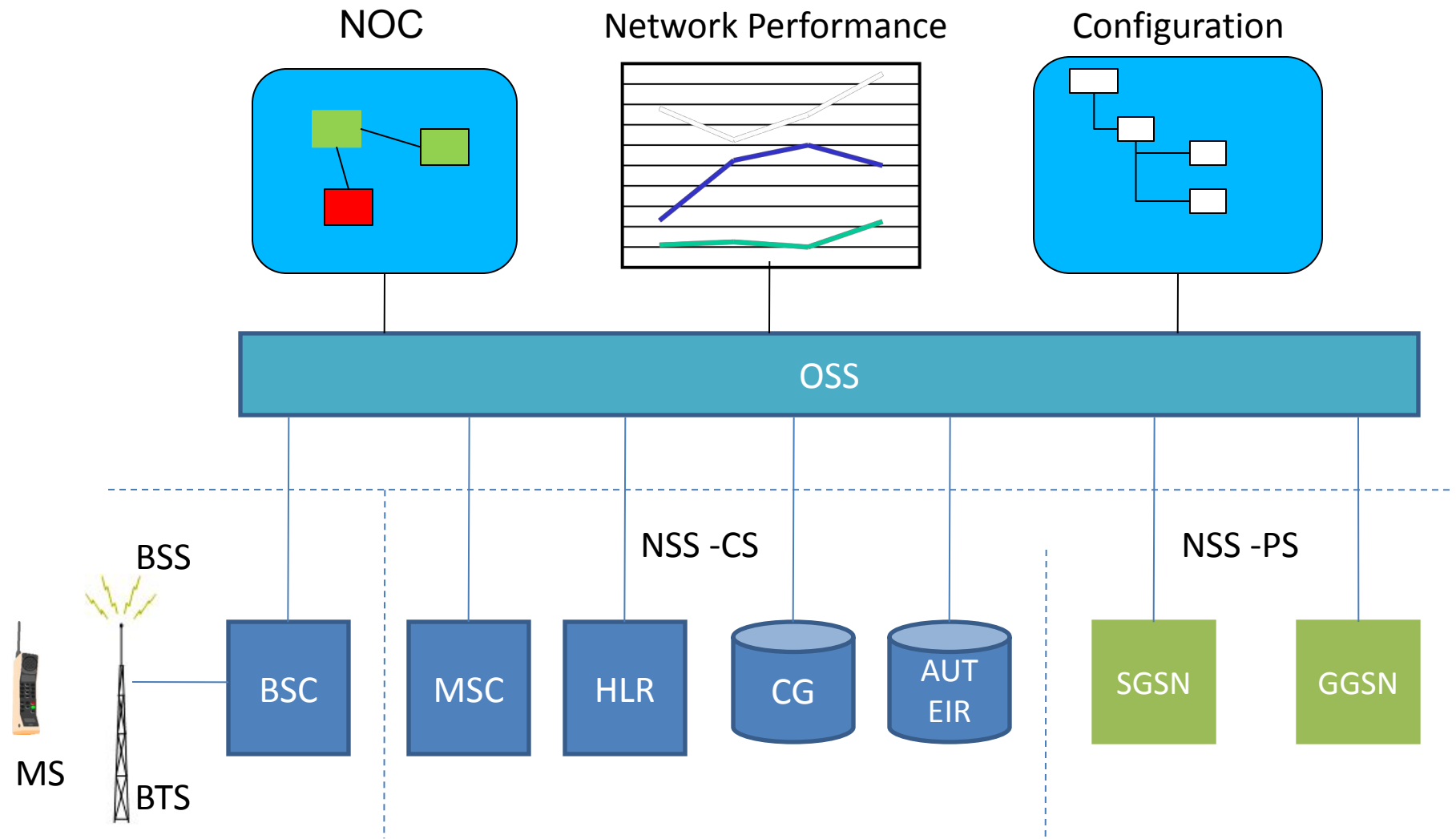

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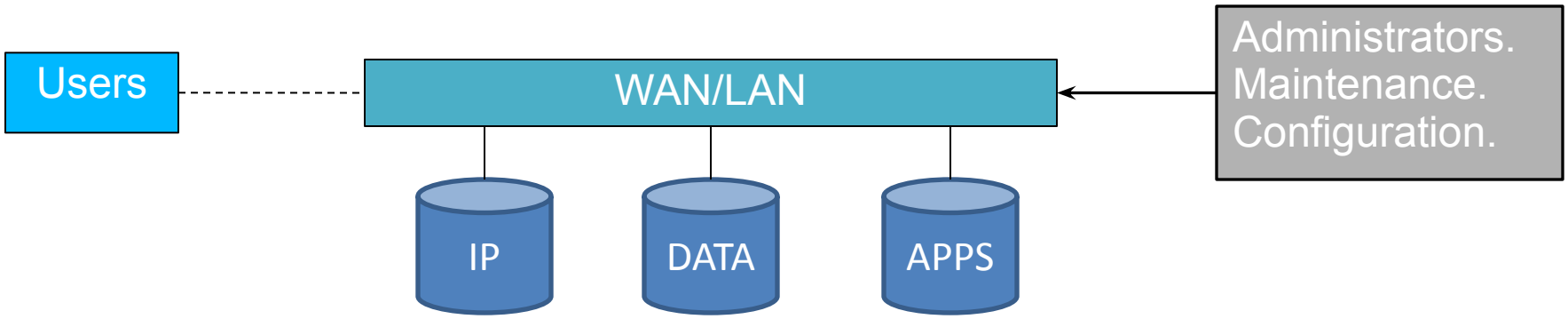


Software – Applications and tools -Users

Hardware – Servers and LAN -Administrators

Software – Operating systems -Administrators

3G Third Generation Mobile Networks

Overview

3G- Also known as UMTS- Universal Mobile Terrestrial System.

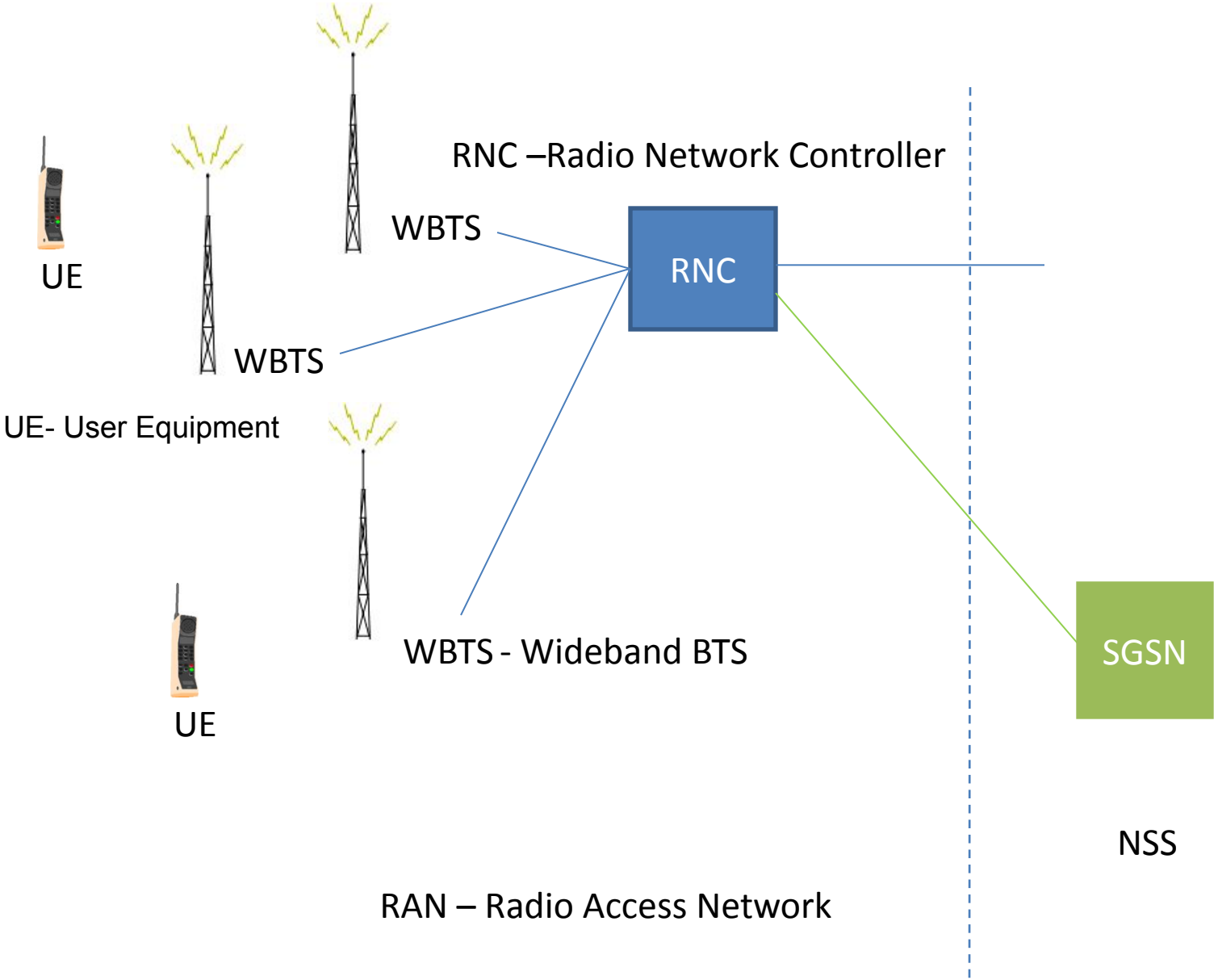
Introduced to provide higher data rates.

Uses different equipment from 2G in the radio interface and some core elements are the same, others are new.

Maybe be the same or different manufacturer to existing 2G.

Can be a 3G only network, for example “3” in the UK.

Designed so calls can be handed between 2G and 3G when needed.


RNC –Radio Network Controller
WBTS
RNC
UE
WBTS
UE- User Equipment
WBTS - Wideband BTS
SGSN
UE
NSS
RAN – Radio Access Network

Similarities and differences

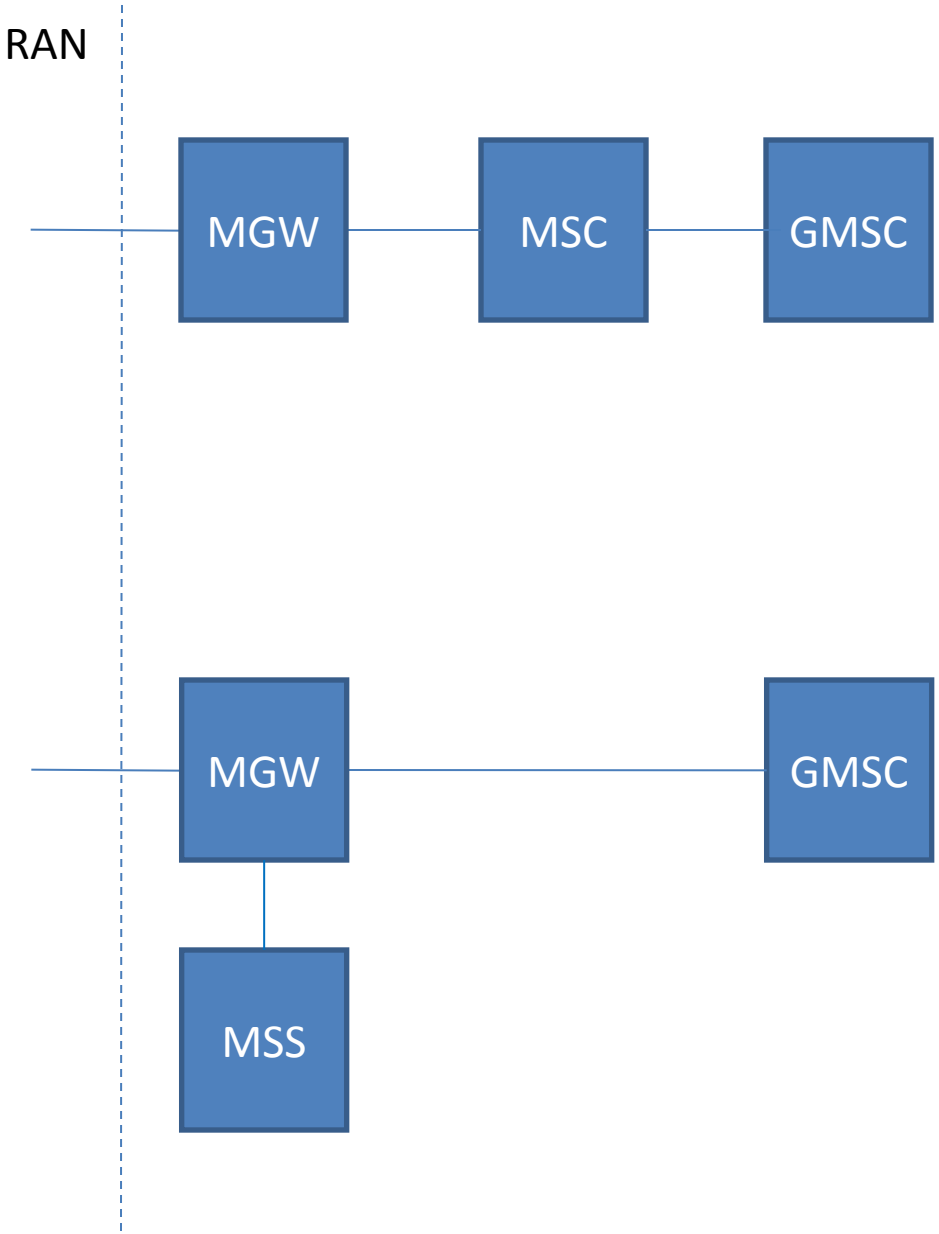
BSS has become RAN- Radio Access Network

MS has become UE- User Equipment, a phone, PDA, credit card machine etc.

BTS has become WBTS- Wideband Base Transceiver Station

BSC has become RNC- Radio Network Controller

NSS- CS Core



Release 99 or R99, first release of 3G.

MGW- Media Gateway

MGW- Converts 3G coding of speech and data to older methods

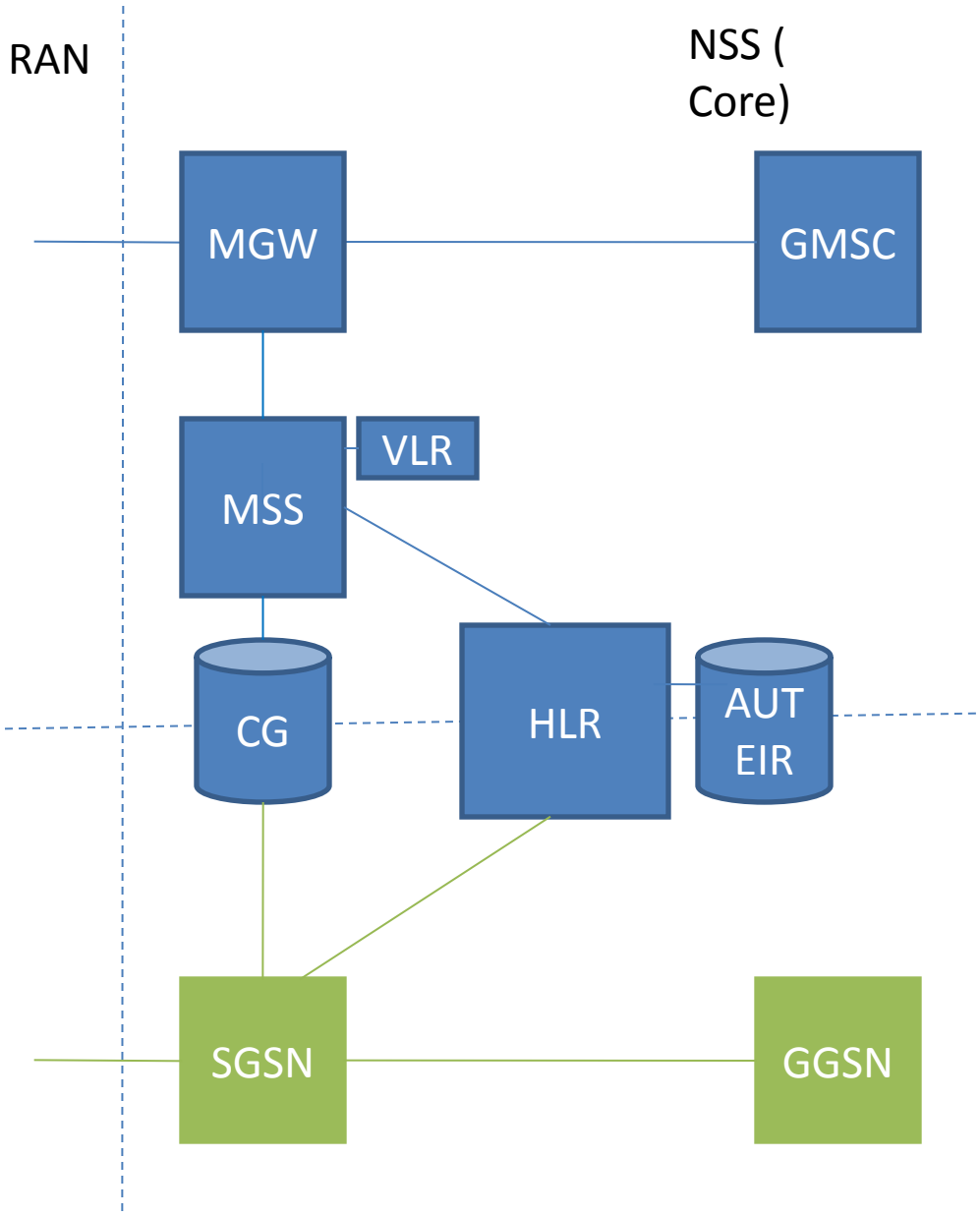
MSC- changes dialled digits and controls switching.

Release 4 or R4 newest release

MGW- Converts 3G coding of speech and data to older methods

MGW- Does all call switching

MSS- changes dialled digits and controls switching.



MGW- Media Gateway

MSS- Mobile Switching Server
GMSC - Gateway MSC

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Personnel

Possible rollout structure