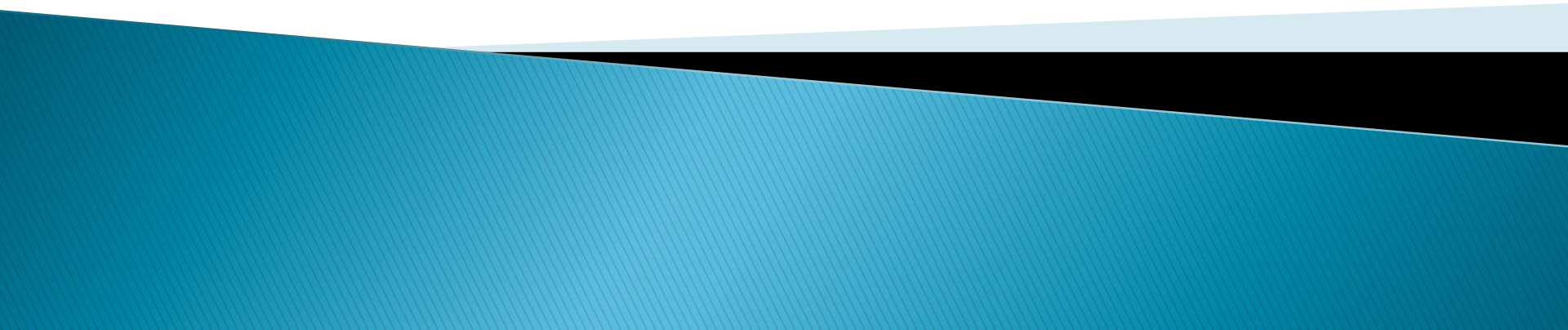
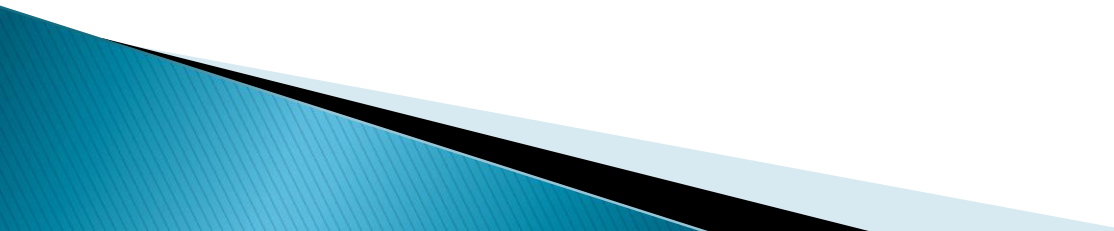


Global System for Mobile Communications

Design Team 1



Introduction

- ▶ Introduction/Background – Ken
 - ▶ Hardware/Architecture – Drew
 - ▶ Hardware/Architecture – Koy
 - ▶ Risk Analysis – Ivan
 - ▶ Applications – Jeff
- 

Background

- ▶ Used for transmitting voice and data services
- ▶ Supports speeds up to 3Mbps
- ▶ Operates on 800MHz and 1.8GHz bands in Europe
- ▶ Operates on 850MHz and 1.9GHz bands in US, Canada and Australia
- ▶ Roaming capability allows contact in 219 countries



History

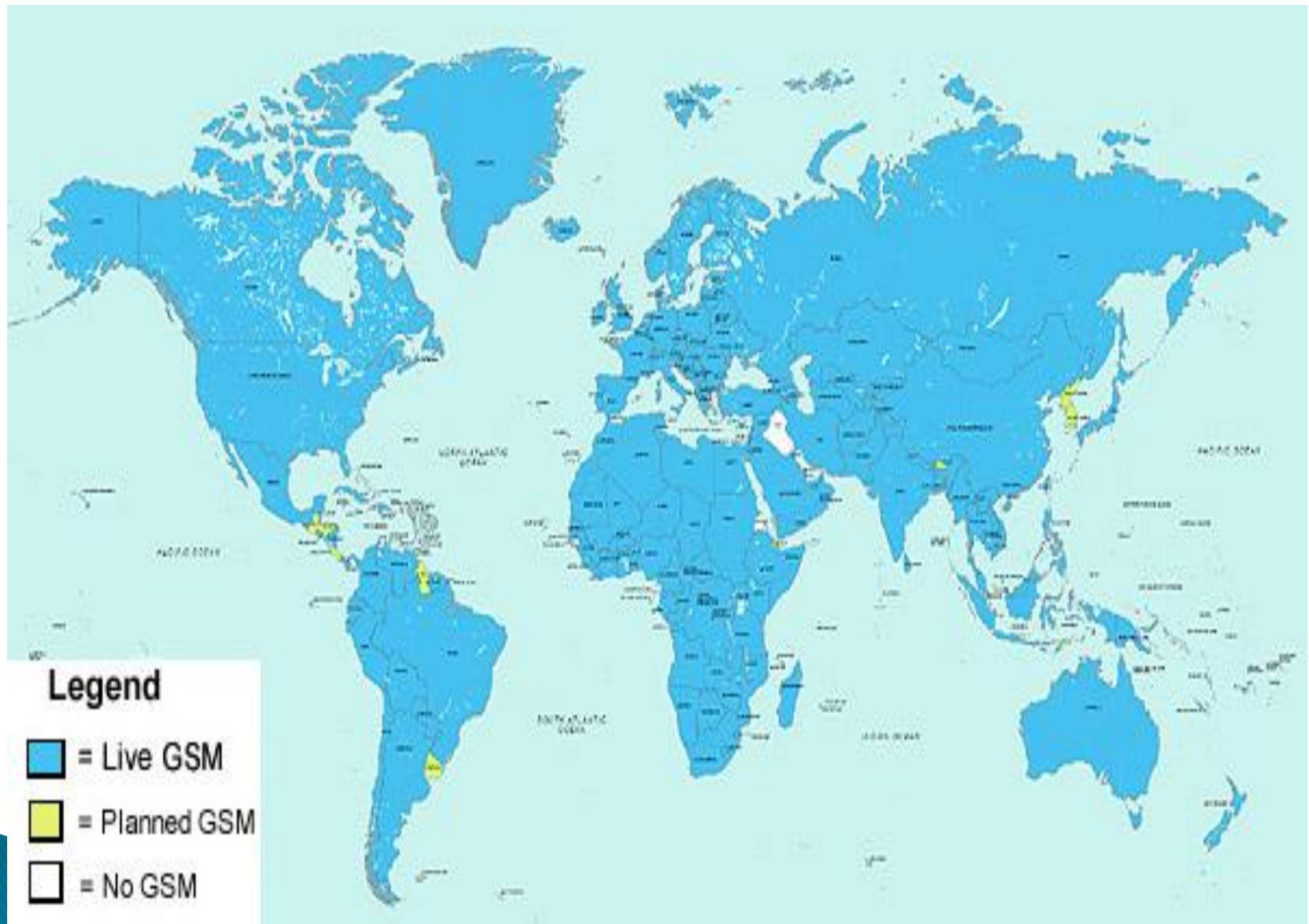
- ▶ 1982 – Groupe Speciale Mobile formed in Europe
- ▶ 1987 – GSM standard is defined
- ▶ 1991 – First GSM phone call made
- ▶ 1994 – One million subscribers
- ▶ 1995 – The US network goes online



History

- ▶ 1996 – Networks go live in Russia and China
- ▶ 1996 – 50 million subscribers worldwide
- ▶ 2002 – 95% of countries worldwide are subscribed
- ▶ Today – over 7 billion GSM connections worldwide





Base Transceiver Station

- ▶ Coverage split into cells
- ▶ Base Transceiver Station covers one to multiple cells
- ▶ Capacity based on number of transceivers



Base Station Controller

- ▶ Controls several base stations
- ▶ Handles handover from one station to another if needed. May handle some basic processing.
- ▶ Local and hard wired to stations.

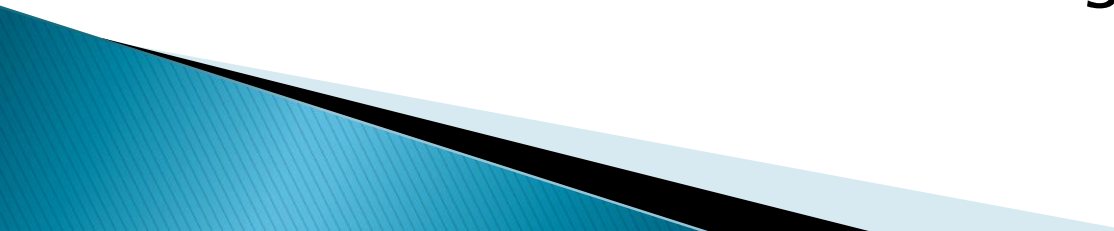


Mobile Switching Center

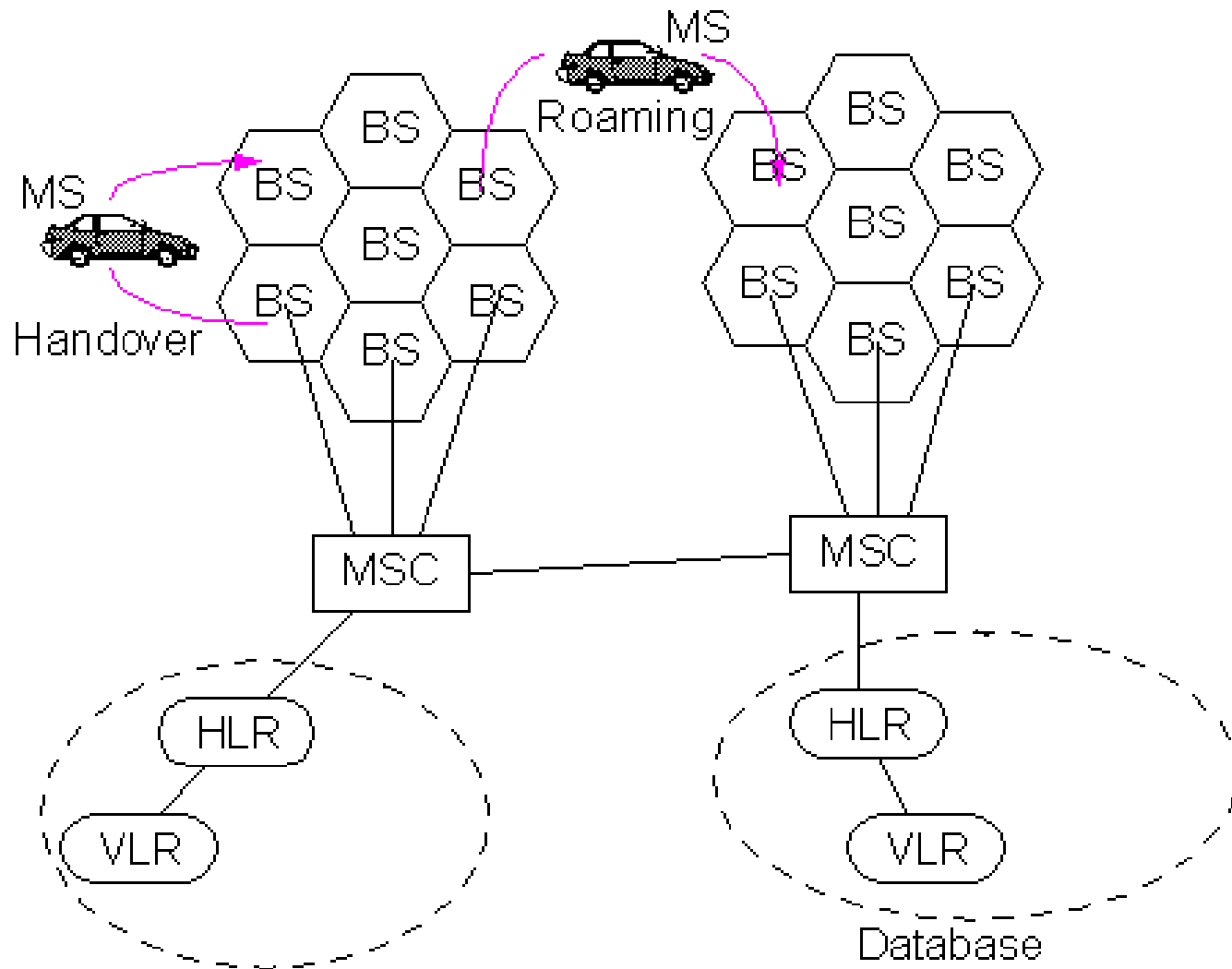
- ▶ Connected to the base station controller at one end and to the carrier network and external networks at the other
- ▶ Responsible for routing calls to and from other networks and tolling. Connected to the PSTN.



Mobile Switch Center (MSC) Contd.

- ▶ Additional connections to the Visiting Location Register and Home Location Register
 - ▶ The Home Location Register (HLR) is the permanent data base that holds identity of all registered subscribers to the service.
 - ▶ The HLR validates all active calls and registers them with the VLR. The MSC routes call if the VLR shows the caller is registered.
- 

So far...



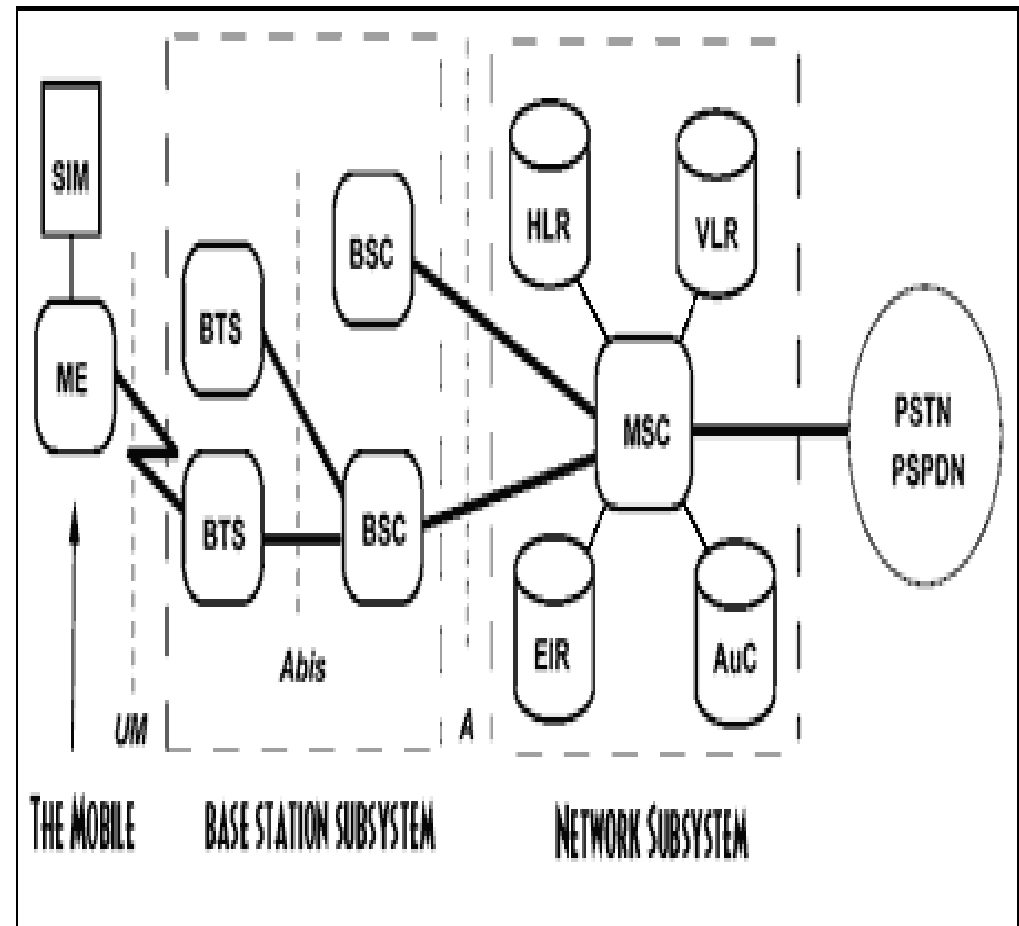
When you make a phone Call...

- ▶ When you make a phone call through GSM. You also NEED:
 - Secret Identity Module
 - Authentication Center (AUC)
 - Equipment Identity Register (EIR)
 - Operation & Maintenance Center (OMC)



When you make a phone Call...

- ▶ When you make a phone call as originator, the signal will go through:
 - Base Transceiver Station
 - Base Station Controller
 - Mobile Switching Center
- ▶ Then as a terminated receiver, the signal will continue from:
 - Mobile Switching Center
 - Base Station Controller
 - Base Transceiver Station
- ▶ Time Division Multiple Access (TDMA)



Concerns with GSM

▶ Theft of Service

- Theft of cell phone results in theft of user's service
- Able to make phone calls and use other services without user's permission
- SIM cards can be switched to another phone to use it's service and information
 - PIN codes help prevent this



Concerns with GSM

► Privacy

- GSM relies on encryption algorithms to secure traffic.
 - If compromised others can read information sent over GSM
- The A5/1, A5/2 and A5/3 stream ciphers used for over-the-air voice privacy.
 - Weaknesses have been found in each one
 - A5/2 seen to be cracked in real time; Retired



Concerns with GSM

- ▶ False Base Transceiver Station (BTS)
 - Able to emulate a GSM base station
 - Can make cell phones connect to false base station by changing Mobile Country Code and Mobile Network Code
 - All traffic goes through station; can do whatever you want with the data that goes through
 - Able to record calls



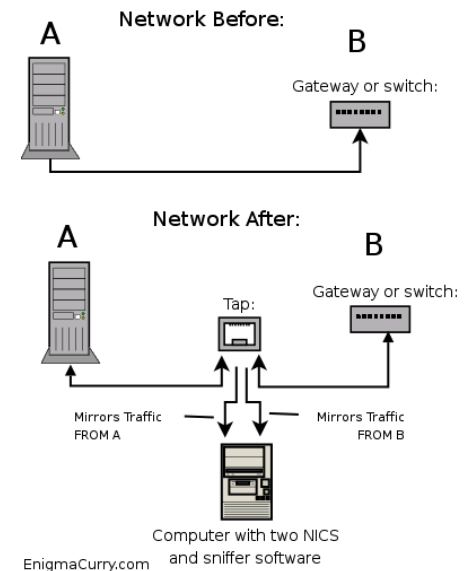
Uses of GSM

- ▶ 7 billion cell devices world wide
- ▶ 80% of all worldwide subscribers
- ▶ Entire land-mass of Earth (major cities)
- ▶ Every United Nations official members(192)
- ▶ United Kingdom over 1 billion text messages every week.



Innovation

- ▶ OnStar equipped vehicles
- ▶ Life Alert
- ▶ Globally controlled devices
- ▶ Credit card / ATM machines
 - Wire tap
- ▶ Alarm systems
- ▶ Satellite powered remote server



Questions?

- ▶ GSM Network
 - ▶ Phone Call Initiation
 - ▶ Security Concerns
 - ▶ Uses and Innovation
- 