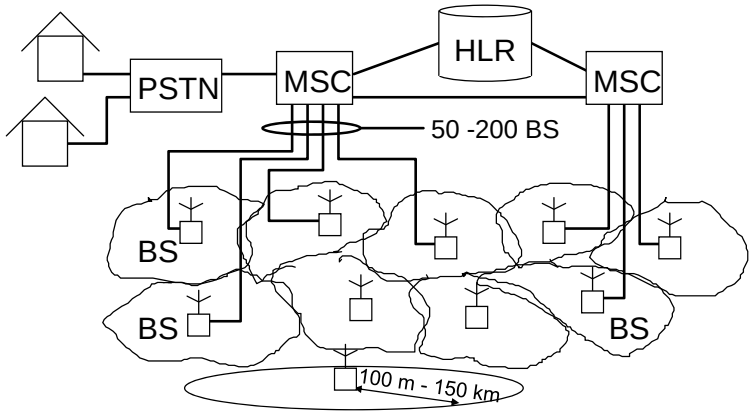
Dimensioning, configuration and deployment of Radio Access Networks.

part 1:
General considerations

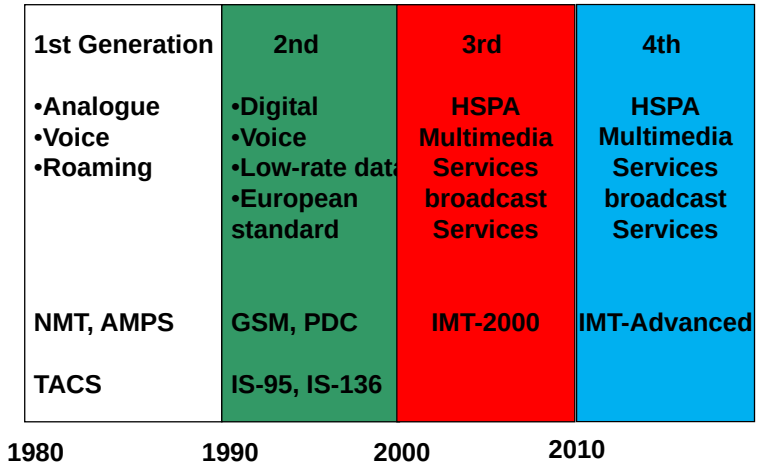
Different types of operators

- Incumbent (e.g. Telia)
- Chalanger (Tele2, 3)
- Internet Service Provider (TDC)
- Joint ventures/Infrastructure companies (3GIS)

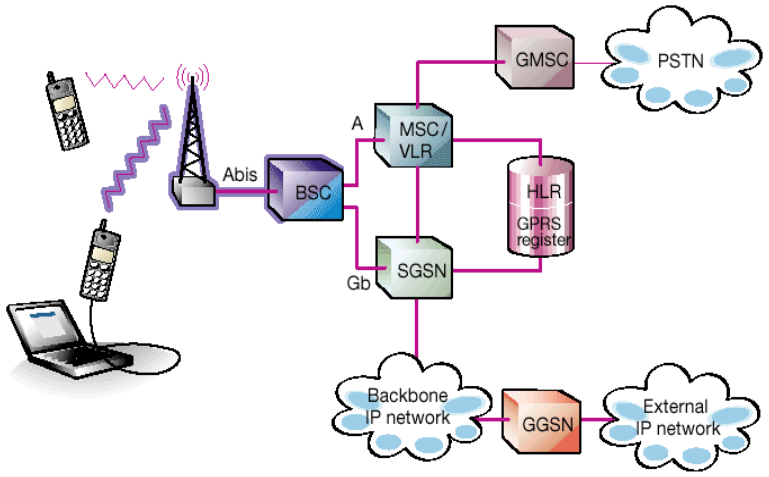
Mobile Telephony Network



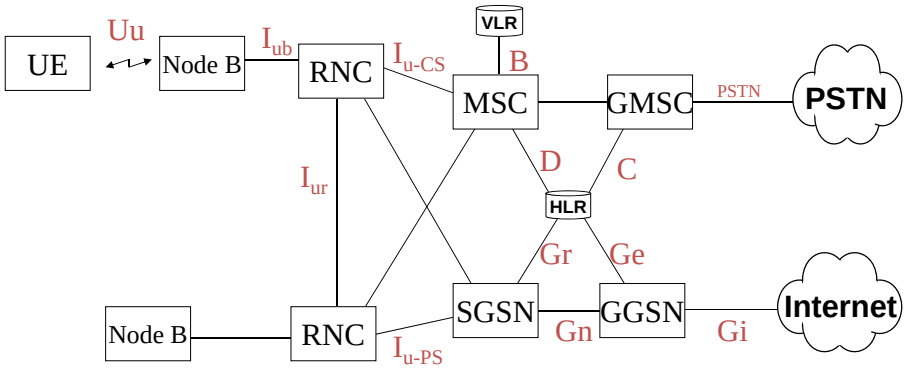
The Evolution of Mobile Telephony



GSM Voice and data architecture



UMTS Network Architecture



Evolving Mobile Generation

- **1G was innovation**
  - I can actually make a phone call in my car!
- **2G was revolution**
  - New infrastructure, frequencies and mobile terminals
  - No backward compatibility, no NMT-GSM handovers
- **3G was evolution**
  - New radio interface, reuse part of 2G network
  - 2G/3G handovers
- **4G will be innovation, revolution and evolution**
  - New radio access and multi-frequency usage, multi-access
  - Enhanced mobility and control functionality

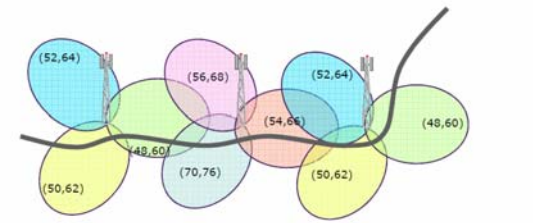
Network Roll-out

Network roll-out involves a number of processes for planning of

- Radio
- Capacity
- Coverage
- Transmission

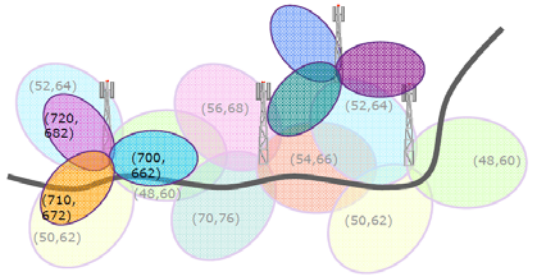
GSM 900 initial roll-out

- 4/12 Reuse pattern for control Channels
- 3/9 for Traffic Channels
- Required sensitivity > 9 dB C/I



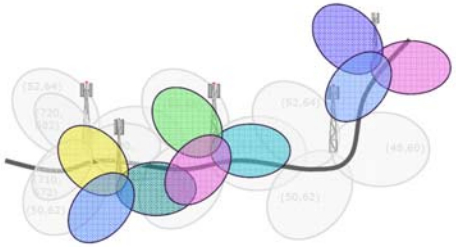
GSM 1800 adding voice capacity

- Co-incident cell boundaries or
- Seperate networks

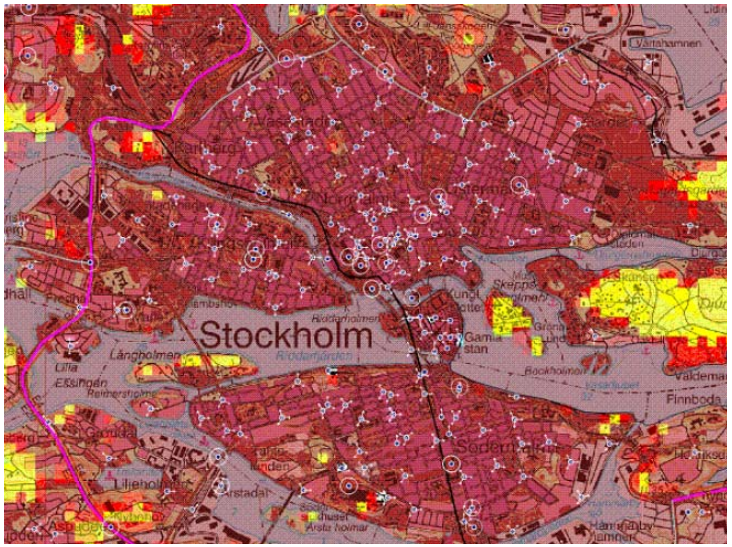


UMTS (3G) adding data capacity

- 3G rel 99 both voice and data
- HSPA adds packet data up to 24Mbps
- Where needed…



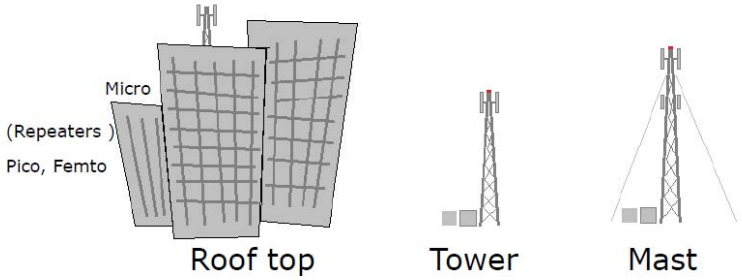
Coverage Map



Capacity and Quality Improvments

- Building New sites (GSM, UMTS or LTE)
  - Coverage
  - Capacity
- Adding Frequencies (e.g. 1800)
- Swapping network elements
  - New technology
  - Adding carriers
- Network optimization
  - Kpi based
  - SON

Site Equipment

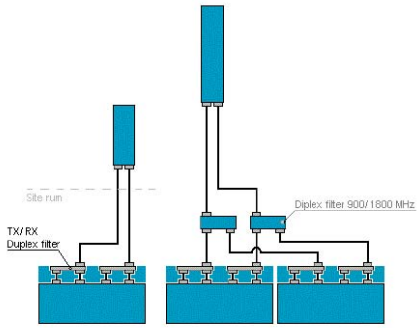


Site Room Equipment

- Active equipment
  - BTS/NodeB/ (RRU)/MRS
  - (Repeaters / Booster)
- Transmission
  - Modem, Fibre, radio/micro wave link.
- Support system
  - Electrical system /BBU
  - Air condition
  - Alarm/monitoring
- Antenna System
  - Coaxial Cables / Jumpers / Connectors /lightning protection
  - (TMA's)
  - Antennas

Tower/Antenna Equipment

- Active equipment
  - BTS/NodeB/ (RRU)
  - (Repeaters / Booster)
- Transmission
  - Modem, Fibre, radio/micro wave link.
- Support system
  - Electrical system /BBU
  - Air condition
  - Alarm/monitoring
- Antenna System
  - Coaxial Cables / Jumpers / Connectors /lightning protection
  - (TMA's)
  - Antennas



54m Guided Mast at Nämndö