Wireless Networks

Chris Lord (cil103)

An Overview of General Packet Radio Service (GPRS)

Based on information from
http://www.comsoc.org/livepubs/surveys/public/3q99issue/bettstetter.html

What is GPRS?

- Bearer service for GSM
- Packet-switched
- Can inter-operate with other packet-switched networks (e.g. IP, X.25)
- Higher data-rates and lower connection times than conventional GSM

GPRS Integration (1)

- Addition of GPRS Support Nodes (GSN)
- All GSNs connected by IP-based GPRS backbone network
  - Intra-PLMN (Public Land Mobile Network) – Connect GSNs on same network, private IP-based networks of the provider
  - Inter-PLMN – Connect GSNs on different PLMNs; requires a roaming agreement to be installed

GPRS Integration (2)

- Serving GSN:
  - Authentication/charging
  - Visited Location Registry (VLR)
  - User profiles
- Gateway GSN
  - Packet delivery between mobile stations and external packet data networks (PDN), e.g. IP, X.25
  - Authentication/charging

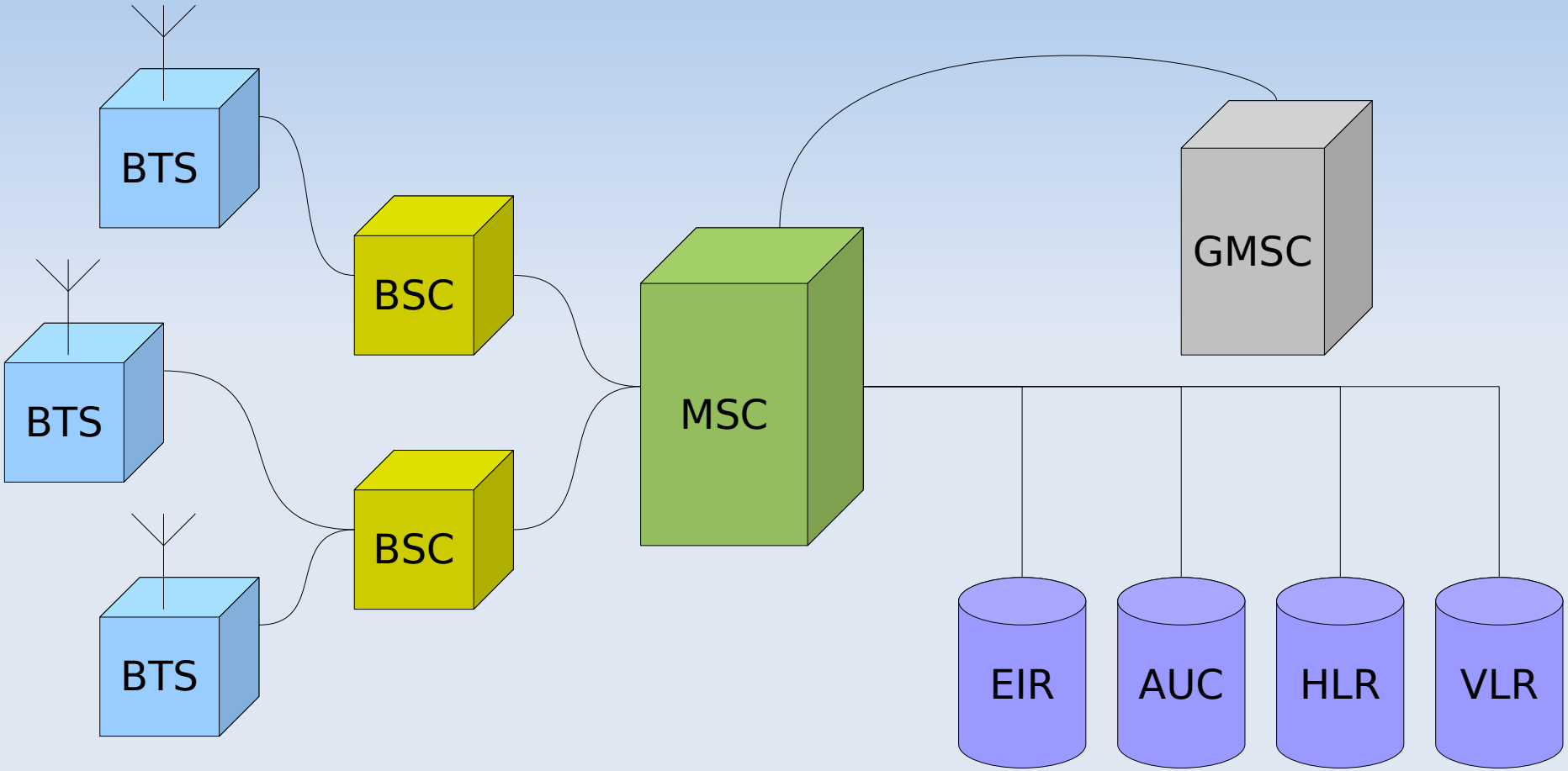
GSM Network Interfaces (1)

- Gb interface: Connects the BSC with the SGSN
- Gn/Gp interfaces: Transmits user data and signalling data between GSNs
  - Gn for transmissions on same PLMN
  - Gp for transmissions on external PLMNs
- Gf interface: IMEI queries
- Gi interface: Connect to external PDNs

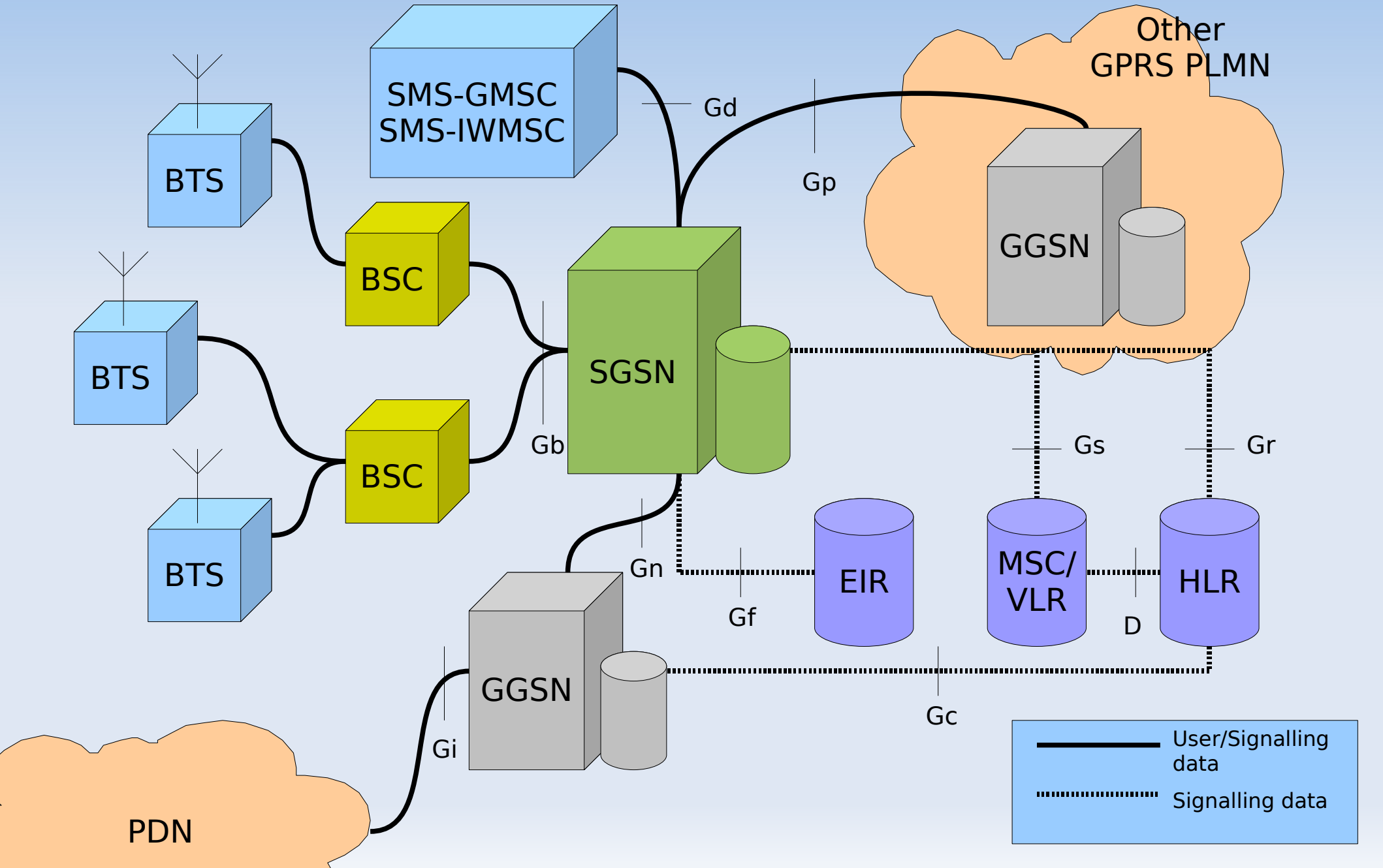
GSM Network Interfaces (2)

- Gr interface: Exchange of user information between HLR and SGSN
- Gc interface: Exchange of location information between GGSN and HLR
- Gs interface: Connects databases of SGSN and MSC/VLR to coordinate between GPRS and conventional GSM networks
- Gd interface: Connects SGSN with SMS Gateway MSC (SMS-GMSC)

GSM System Architecture



GPRS System Architecture



Services

- Bearer services for GPRS offer end-to-end packet-switched data transfer. Two types:
  - Point-to-point (PTP)
    - Internet access
    - SMS messages
  - Point-to-multipoint (PTM)
    - Unidirectional distribution of information (e.g. weather, news)
    - Conferencing services between multiple users

Quality of Service (1)

- QoS profiles can be defined using parameters derived from service precedence, reliability, delay and throughput.
- QoS profiles can be negotiated between the mobile user and the network, per session, depending on current resources, and can affect billing

Quality of Service (2)

- Three priorities: High, Medium, Low
- Three reliability classes that guarantee maximum values of loss, duplication, mis-sequencing and corruption of packets
- Delay defines maximum mean delay and 95-percentile delay
- Throughput specifies peak and mean bit-rate

GPRS and Conventional GSM

- GSM/GPRS services can be used in parallel. Three classes of mobile station:
  - Class A – Simultaneous use of GSM and GPRS
  - Class B – Can register for both GSM and GPRS, but only use one at a time
  - Class C – Can attach for only either GSM or GPRS (with the exception of SMS messages)

Fin