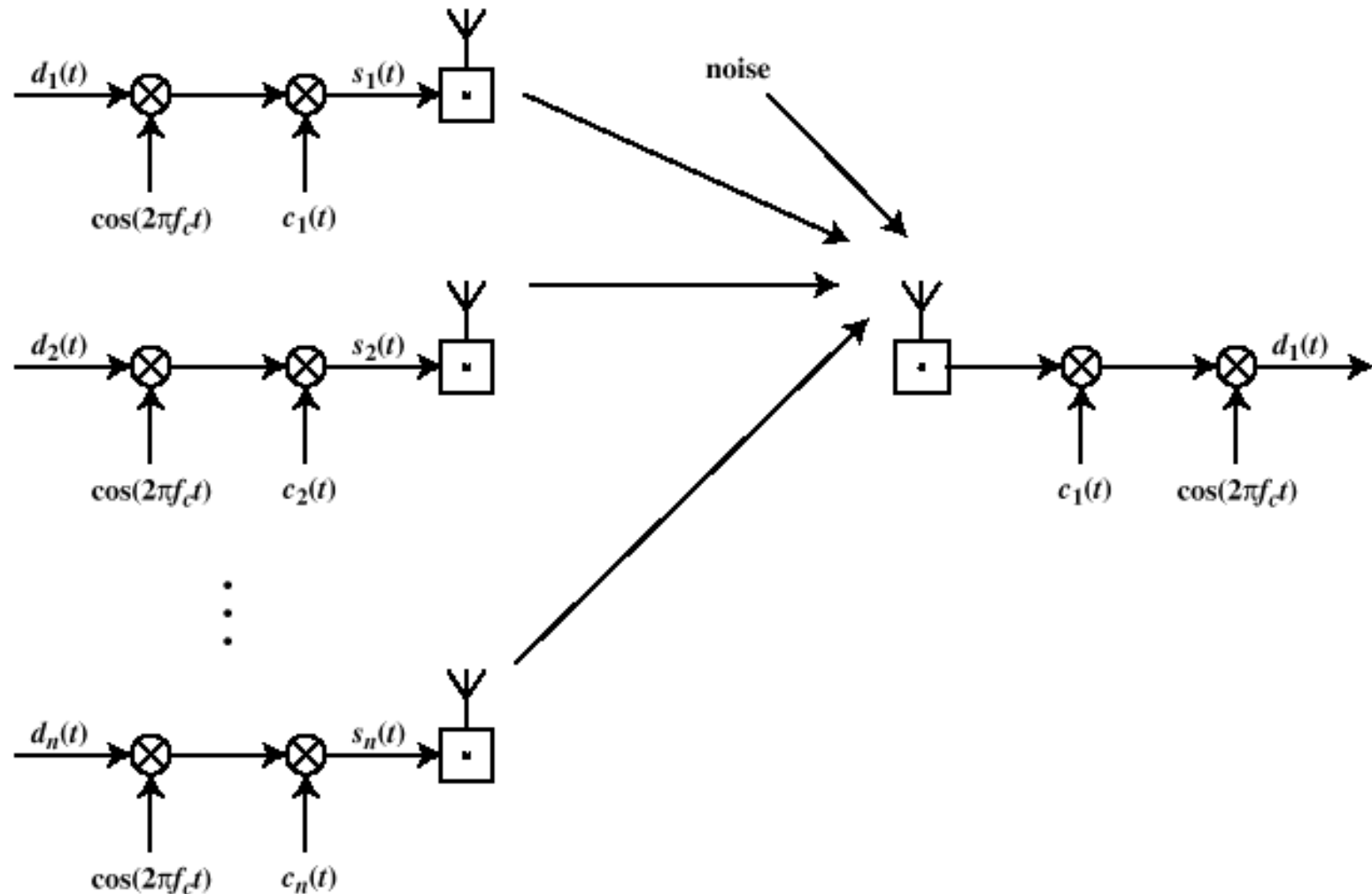


6.4.4 CDMA for DSSS





6.4.5 What is GPRS ?

- General Packet Radio Service (GPRS) is a new bearer service for GSM that greatly improves and simplifies wireless access to packet data networks
- GPRS applies packet radio principal to transfer user data packets in an efficient way b/w MS & external packet data network



GPRS Mobile Stations:

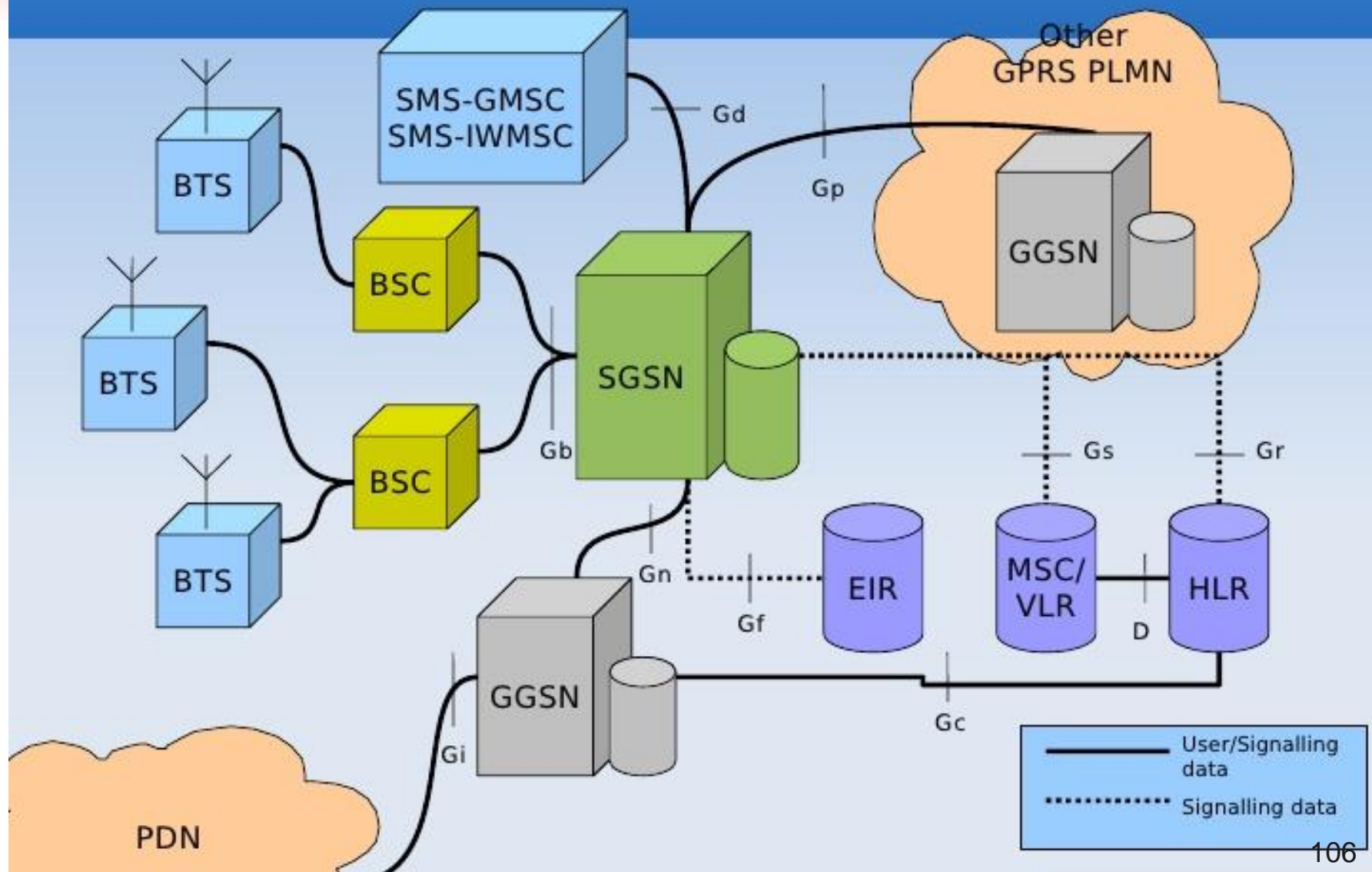
New Mobile Station are required to use GPRS services because existing GSM phones do not handle the enhanced air interface or packet data. A variety of MS can exist, including a high-speed version of current phones to support high-speed data access, a new PDA device with an embedded GSM phone, and PC cards for laptop computers. These mobile stations are backward compatible for making voice calls using GSM



Benefits of GPRS

- New Data Services
- High Speed (Data Rate 14.4 – 115 kbps)
- Efficient use of radio bandwidth (Statistical Multiplexing)
- Circuit switching & Packet Switching can be used in parallel
- Constant connectivity

GPRS System Architecture



6.5 WiFi, Bluetooth and ZigBee

By: Dr Musaddaq Mahir Abdul Zahra

6.5.1 Wireless Technology Differences

Standard	Family	Downlink (Mbps)	Uplink (Mbps)	Coverage
WiFi	802.11	11/54/150/300		100m
WiMAX	802.16e	144	35	10km
UMTS (3G) /HSPA (3.5G)	3GPP	14.4	5.76	30km
LTE (4G)	3GPP	360	80	30km

6.5.2 Diference between WiFi & WiMAX

WiFi vs. WiMAX

	IEEE 802.11	IEEE 802.16a
Max Speed	54Mbps (a&g)	10-100Mbps
Range	100m	40 km
Coverage	Indoor	Outdoor
Users	Hundred	Thousand
Service Level	None	Yes

6.5.3 Bluetooth vs. WiFi

	Bluetooth	Wifi
Specifications authority	Bluetooth SIG	IEEE, WECA
Year of development	1994	1991
Bandwidth	Low (800 Kbps)	High (11 Mbps)
Hardware requirement	Bluetooth adaptor on all the devices connecting with each other	Wireless adaptors on all the devices of the network, a wireless router and/or wireless access points
Cost	Low	High
Power Consumption	Low	High
Frequency	2.4 GHz	2.4 GHz
Security	It is less secure	It is more secure
Range	10 meters	100 meters
Primary Devices	Mobile phones, mouse, keyboards, office and industrial automation devices	Notebook computers, desktop computers, servers
Ease of Use	Fairly simple to use. Can be used to connect upto seven devices at a time. It is easy to switch between devices or find and connect to any device.	It is more complex and requires configuration of hardware and software.

6.5.4 Bluetooth vs. ZigBee

	Bluetooth (v1)	ZigBee
Protocol Stack	250 kb	< 32 kb (4kb)
Range	10 - 100 meters	30 - 100 meters
Link Rate	1 Mbps	250 kbps
Battery	rechargeable	non-rechargeable
Devices	8	2^{16}
Air Interface	FHSS	DSSS
Usage	frequently	infrequently
Network Join Time	long	short
Extendibility	no	yes
Security	PIN, 64 bit, 128 Bit	128 bit, AES