

# Wireless & IEEE Standards

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# Outline

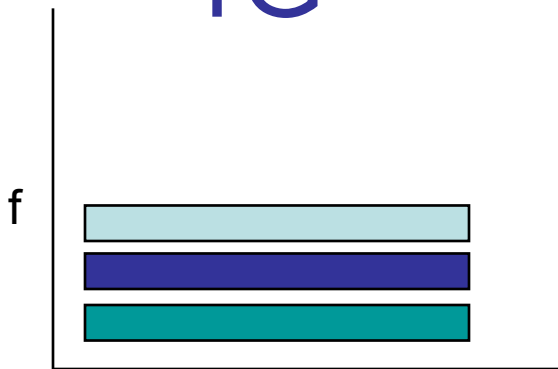
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- Technology evolution
- Cellular & IEEE standards
- Typical multi std. architecture
- Typical multi mode front end
- 3G Cellular+IEEE comparison
- RF Rx/Tx specifications

# Why Various Standards?

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1G

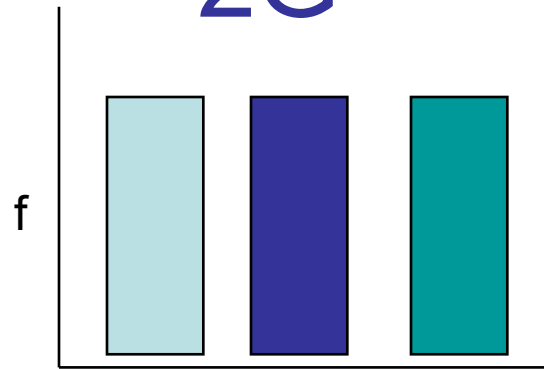


FM

X users

Money ..

2G

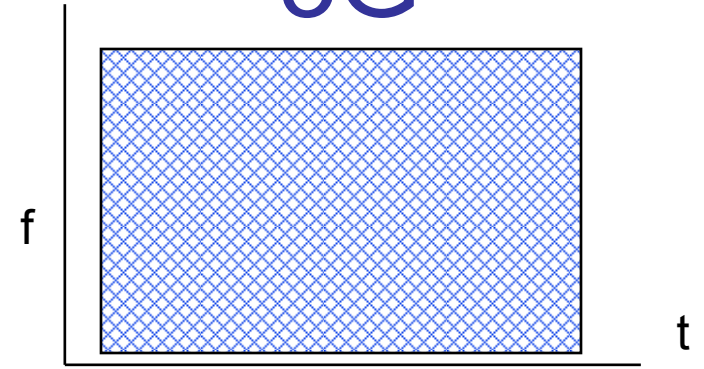


Time

3-8 X

Money ..

3G

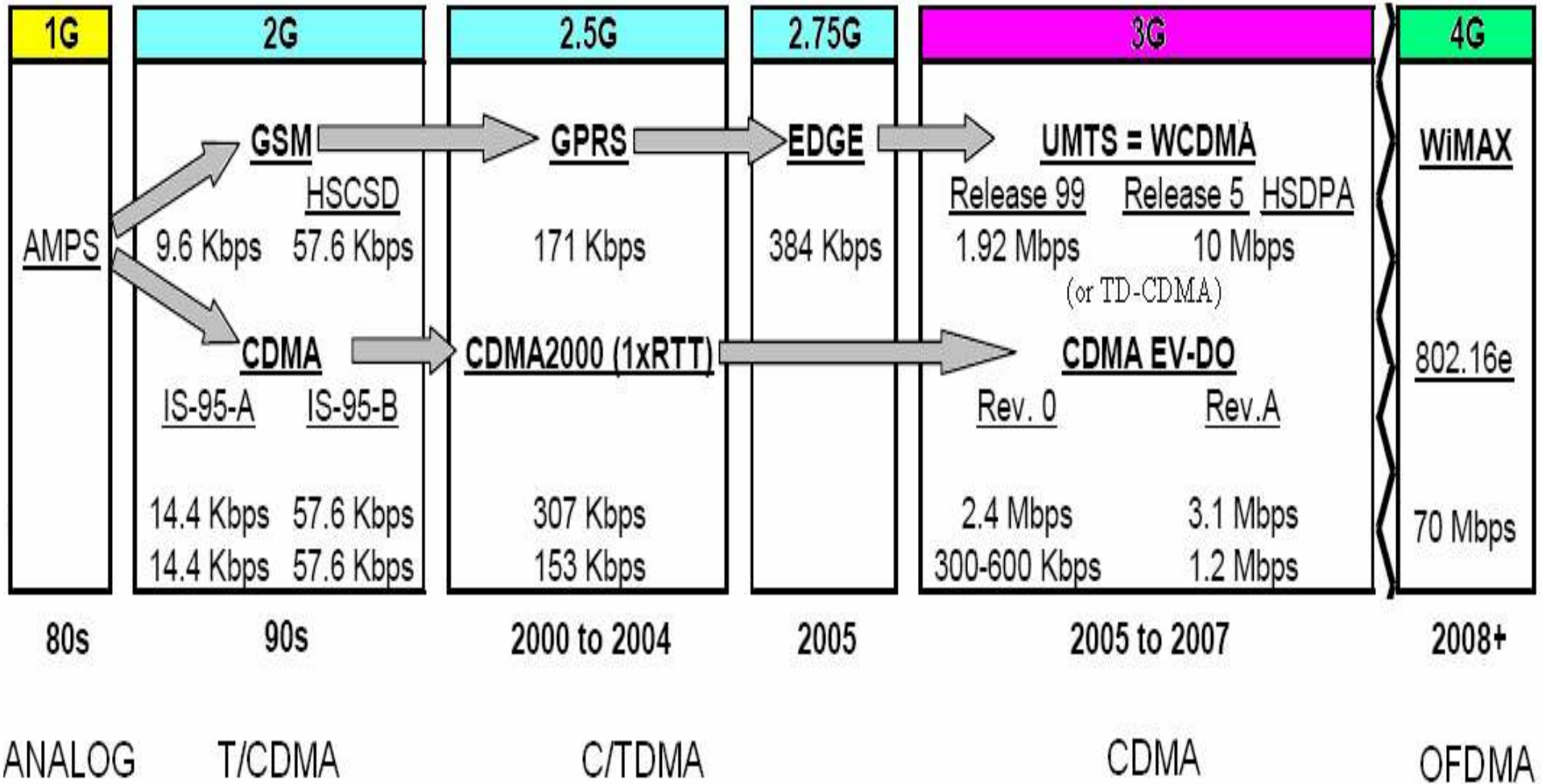


Code

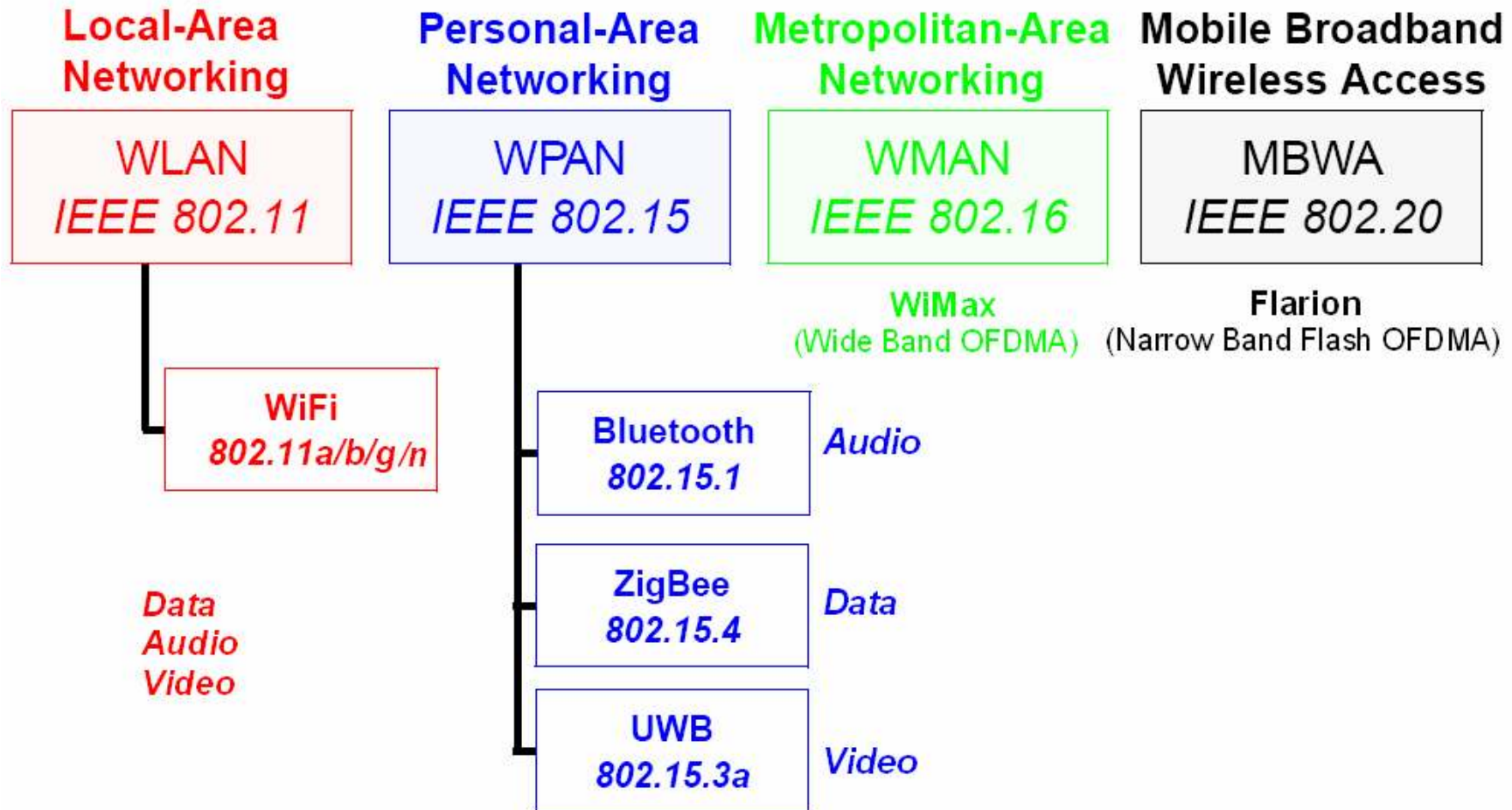
8-30 X

Money ..

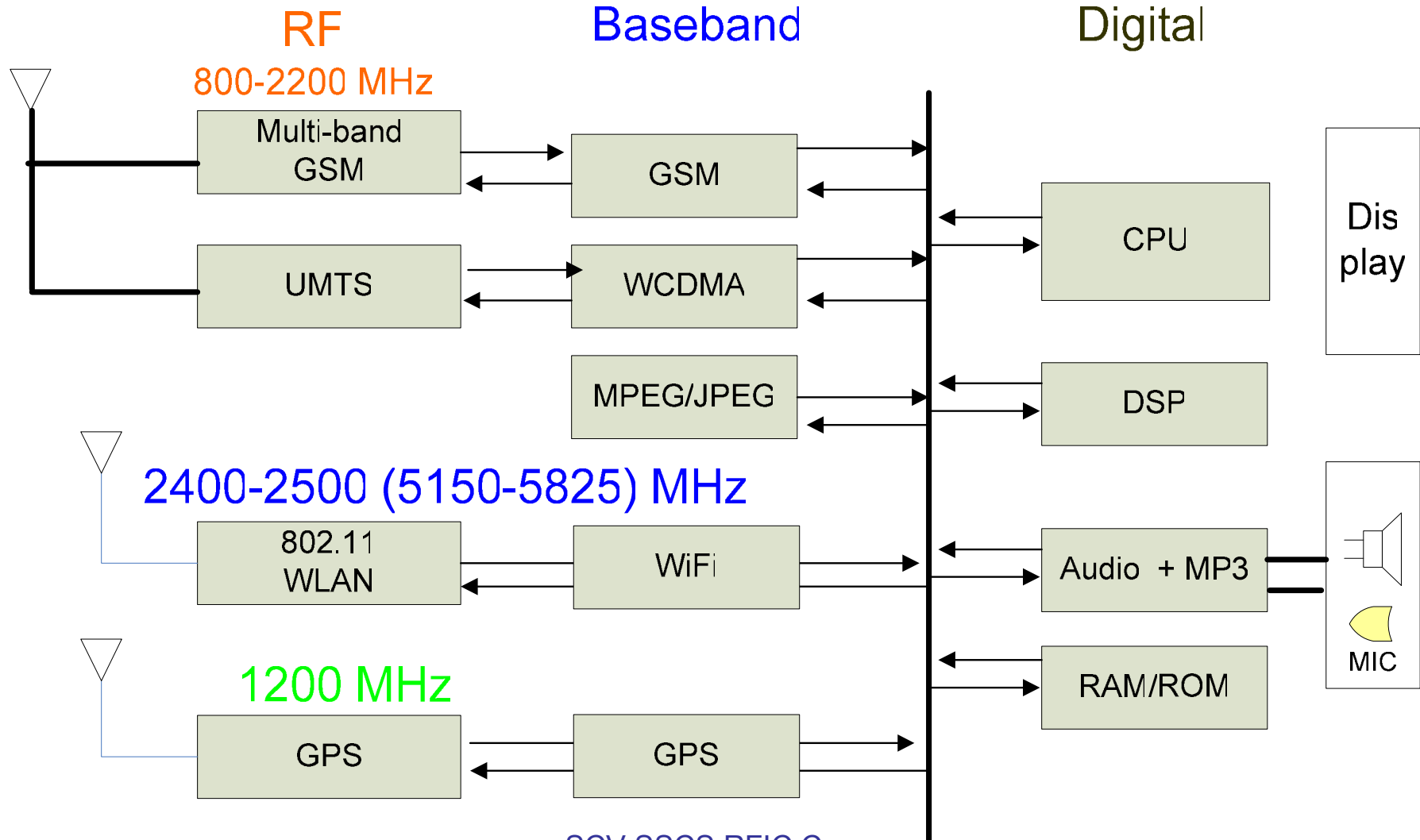
# Cellular Standards Evolution



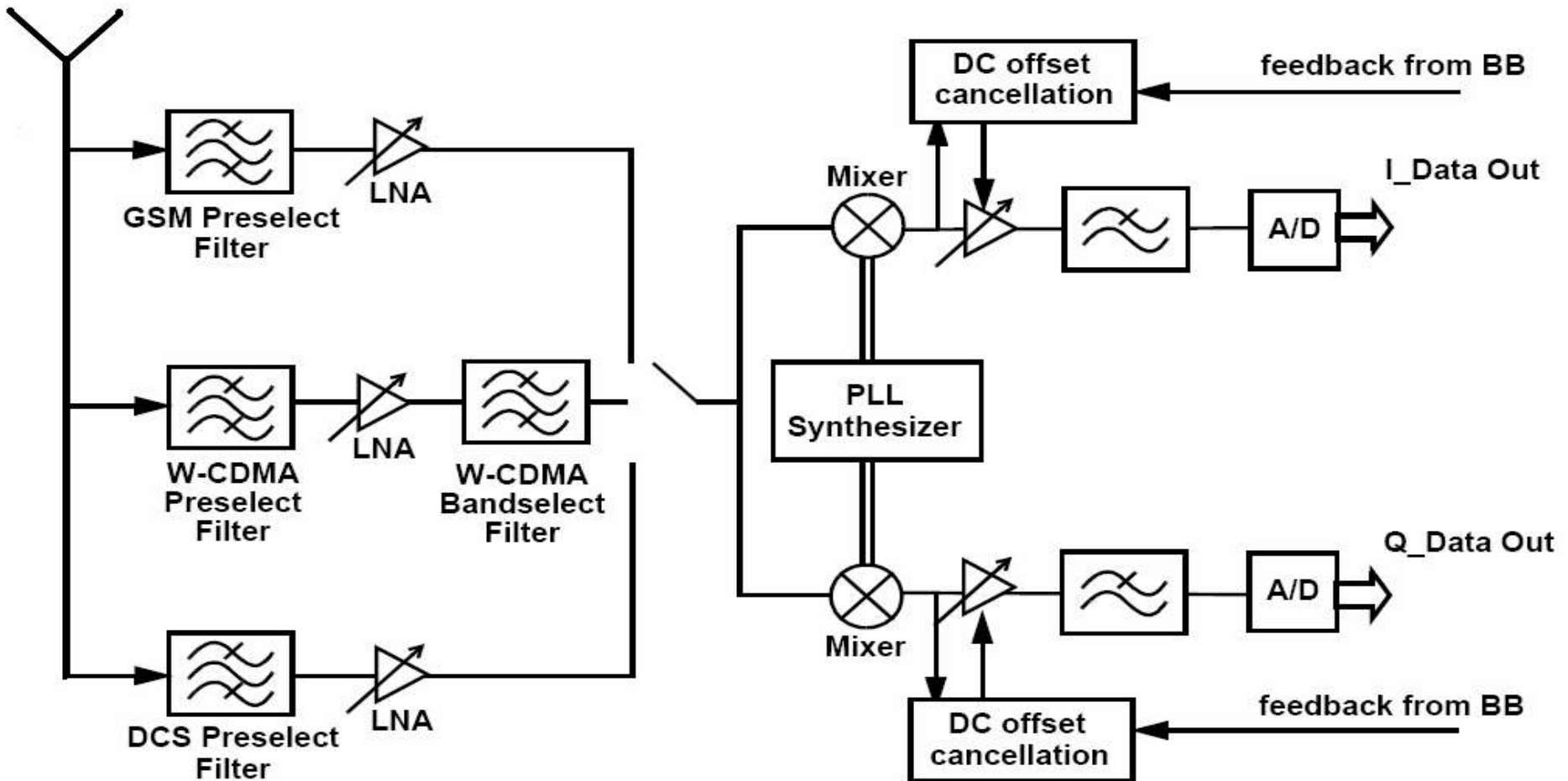
# IEEE Standards Evolution



# Multi Mode Device



# Multi Mode Front End



# Cellular Comparison

	3G		CDMA		TDS Standard		Wimax	
	WCDMA	HSDPA	EVDO rev 0	EVDO rev A	TD-CDMA	TDS-CDMA	802.16d	802.16e
Industry	3GPP	3GPP	3GPP2	3GPP2	3GPP	Chinese	IEEE	IEEE
Rollout	2003/04	2006/07	2002	2H 06	2004/05	2008	2005	2008/09
Peak speed	384 Kbps	1.8-7.2 Mbps	2.4 Mbps	3.1 Mbps	3 Mbps	2-4 Mbps	3 Mbps	20 Mbps
Channel	5 MHz	5 MHz	1.25 MHz	1.25-20 MHz	1.25-10 MHz	1.25-10 MHz	1.25-20 MHz	1.25-20 MHz
Strength	Increased voice capty	S/w upgarde for high BW	High data rate	S/w upgarde for high BW	Customised for TD	Political Support	OFDM technology	Cheaper Efficient
Weakness	Low data speed	Uplink capacity	Uplink capacity	Uplink capacity	Vendor Support	Proprietary Only- China	Lack of mobility	Timing Uncertain

# IEEE Comparison

Ideal For	Wireless B	Wireless G (802.11 G)	Wireless A/G	Wireless N
Sharing A High Speed Internet Connection	✓	✓	✓	✓
Basic File And Print Sharing	✓	✓	✓	
Transmitting Audio Files	✓	✓	✓	✓
Transmitting Still Picture	✓	✓	✓	✓
Multi Player Gaming Over the Internet	✓	✓	✓	✓
Internet Phone Call (VoIP)		✓ With Quality of service	✓	✓
Transmitting Video Files or Streaming Video		✓ With Quality of service	✓	✓
Multi User - Heavy Internet Usages or File Sharing			✓	✓
Multi Player Gaming Over The Wireless LAN			✓	✓
Congested Wireless Environment (Dense Housing Multiple Wireless Network or Interfering 2.4Ghz Devices)			✓	✓
Larger Home and Offices				✓
Heavy Multiple Use With Multiple Users				✓
Streaming High Definition Video				✓

# Typical Receiver Front End Specs

	Parameter	W-CDMA	GSM (0.9 GHz)	GSM (1.9 GHz)
LNA	Gain [dB]	18	18	18
	NF [dB]	1.5	1.5	1.5
	IIP <sub>3</sub> [dBm]	-1	-10	-10
	IIP <sub>2</sub> [dBm]	17		
	I <sub>DC</sub> [mA]	4	4	4
Mixer	Gain [dB]	8	13	13
	DSB NF [dB]	6	6	6
	IIP <sub>3</sub> [dBm]	7	8	8
	IIP <sub>2</sub> [dBm]	43	41	41
	I <sub>DC</sub> [mA]	5	3	4

# Typical Transmitter Specs

System	Modulation	BW [kHz]	Output Power [dBm]	Power Control [dB]	ACPR 1 <sup>st</sup> /2 <sup>nd</sup> /3 <sup>rd</sup> [dBc]	Duplex Spacing [MHz]
GSM	GMSK	200	33	30	30/60/60	45/60
EDGE	8PSK	200	27	30	30/54/60	45/60
W-CDMA	QPSK	3840	24	>74	33/43	190
CDMA 2000	OQPSK	1250	29	>74	42/54	45/60

# Backup

# Technology Evolution

**1G**  
AMPS  
AMPS

**2G**  
TDMA/AMPS  
CDMA/AMPS

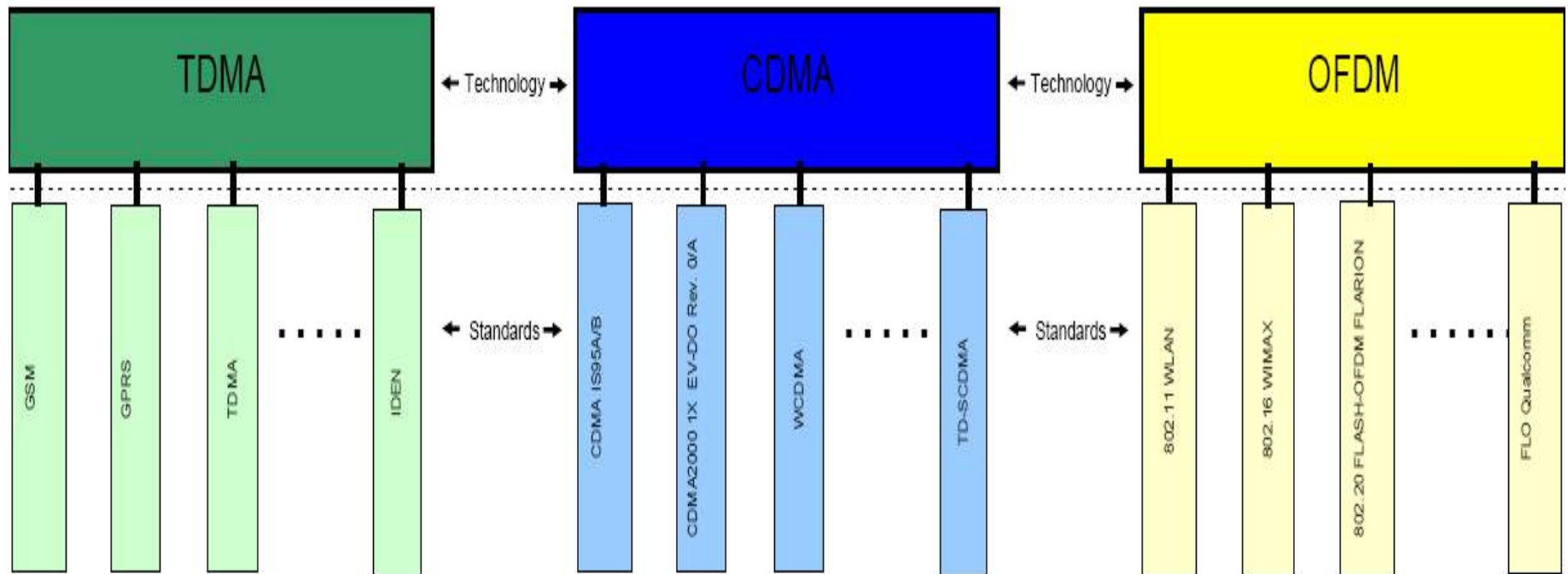
**3G**  
CDMA/TDMA  
CDMA/CDMA

**4G**  
OFDM/CDMA  
OFDM/CDMA

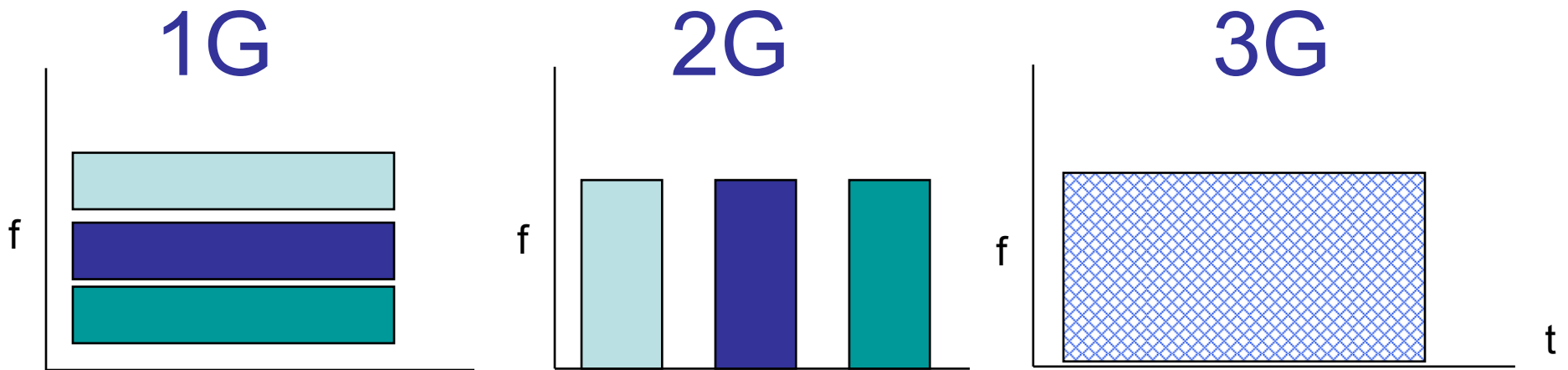
**2G**  
TDMA-Time Division Multiple Access

**3G**  
CDMA-Code Division Multiple Access

**XG**  
OFDMA=Orthogonal Frequency Division Multiplexing



# Why Various Standards?



FM

Time

Code

X users

3-8 X

8-30 X

Money .. Money .. Money ..