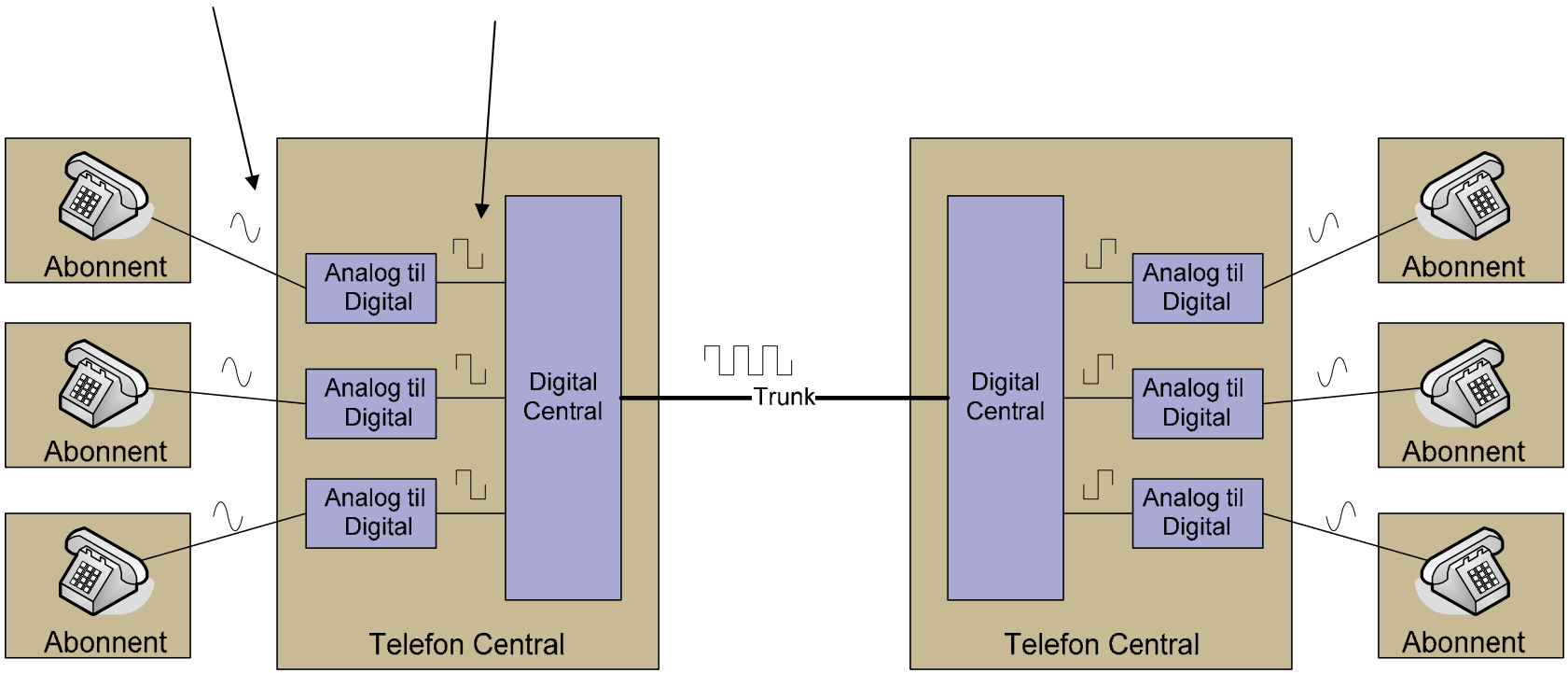
Repetition H1 Tele 2010

Principdiagram



ISDN BRA

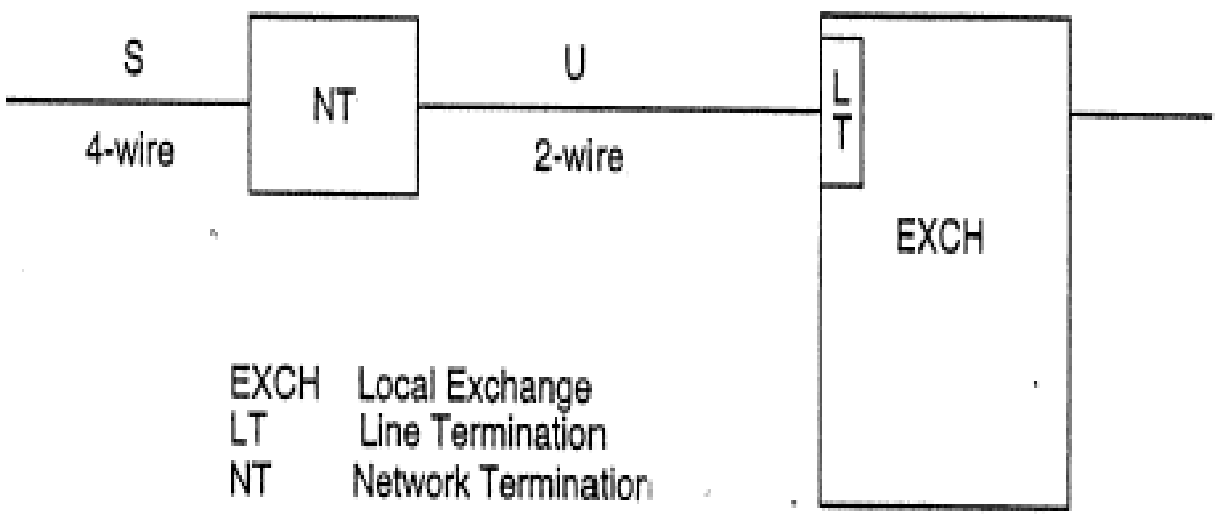


Fig. 2.9:

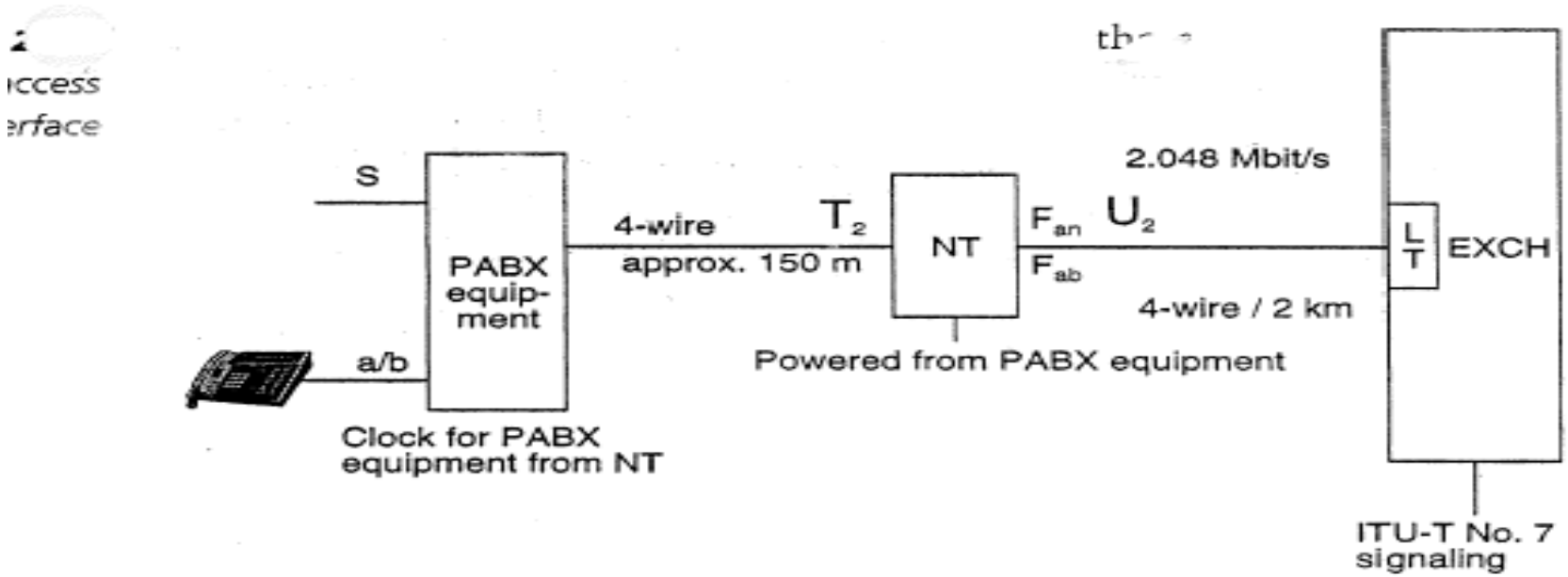
Basic access netw

termination

ISDN BRA

- 2 stk. B-kanaler af: 64 Kb/s
  1 Stk. D-kanal af 16 Kb/s

ISDN PRA
2 Mb/s = 30 tale-kanaler + 2 signalering af 64 Kb/s



Effekt

$$10 \cdot \log\left(\frac{p2}{p1}\right)$$

Spænding

$$20 \cdot \log\left(\frac{U2}{U1}\right)$$

Eksempler

- Effekt
  - Fordobling af effekten 10*log(2)= 3 dB
  - Firedobling af effekten 10*log(4)= 6 dB
  - 100dobling af effekten 10*log(100)= 20dB
- Spænding
  - Fordobling af spændingen 20*log(2)= 6 dB
  - Firedobling af spændingen 20*log(4)= 12 dB
  - 100dobling af spændingen 20*log(100)= 40 dB

Relative dBm

- dBm Relativ til 1mW ved 50 Ohm
- dBm ved 600 Ω medføre at dBm(600Ω):

$$\sqrt{P \cdot R}$$

$$\sqrt{0.001 \cdot 600} = 0.775$$ V1 ved 600 Ohm

$$\sqrt{0.001 \cdot 50} = 0.224$$ V1 ved 50 Ohm

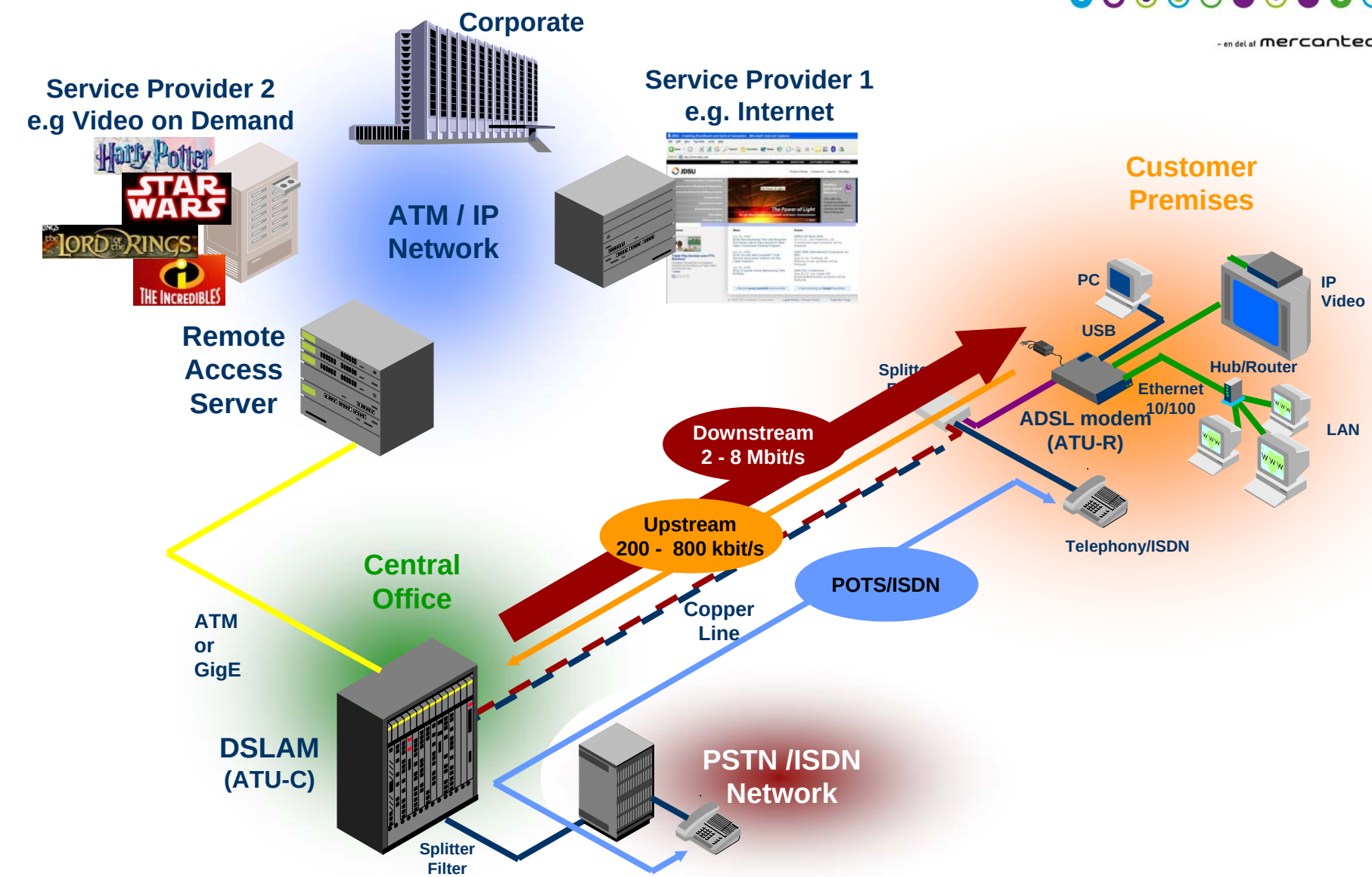
$$20 \cdot \log\left(\frac{U2}{0.775}\right)$$

Relative dBµV

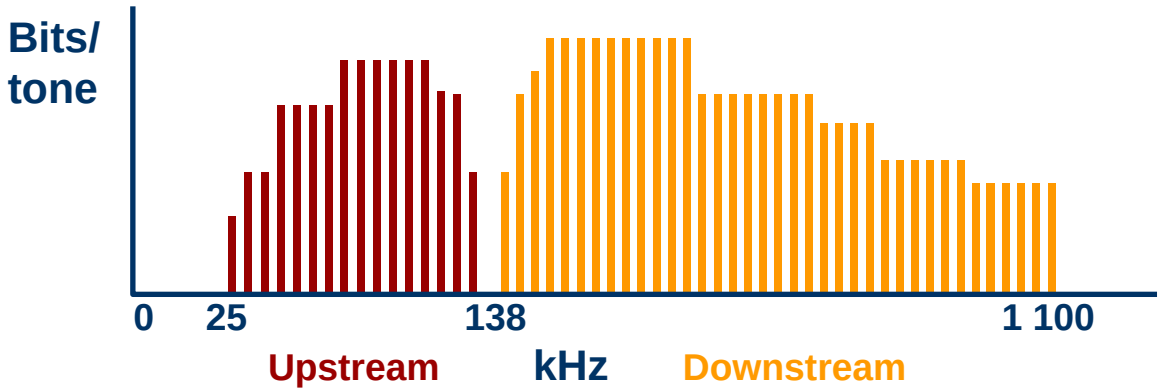
- dBµV Relativ til 1µV

$$dB\mu V = 20 \cdot \log\left(\frac{U2}{10^{-6}}\right)$$

ADSL in the Network



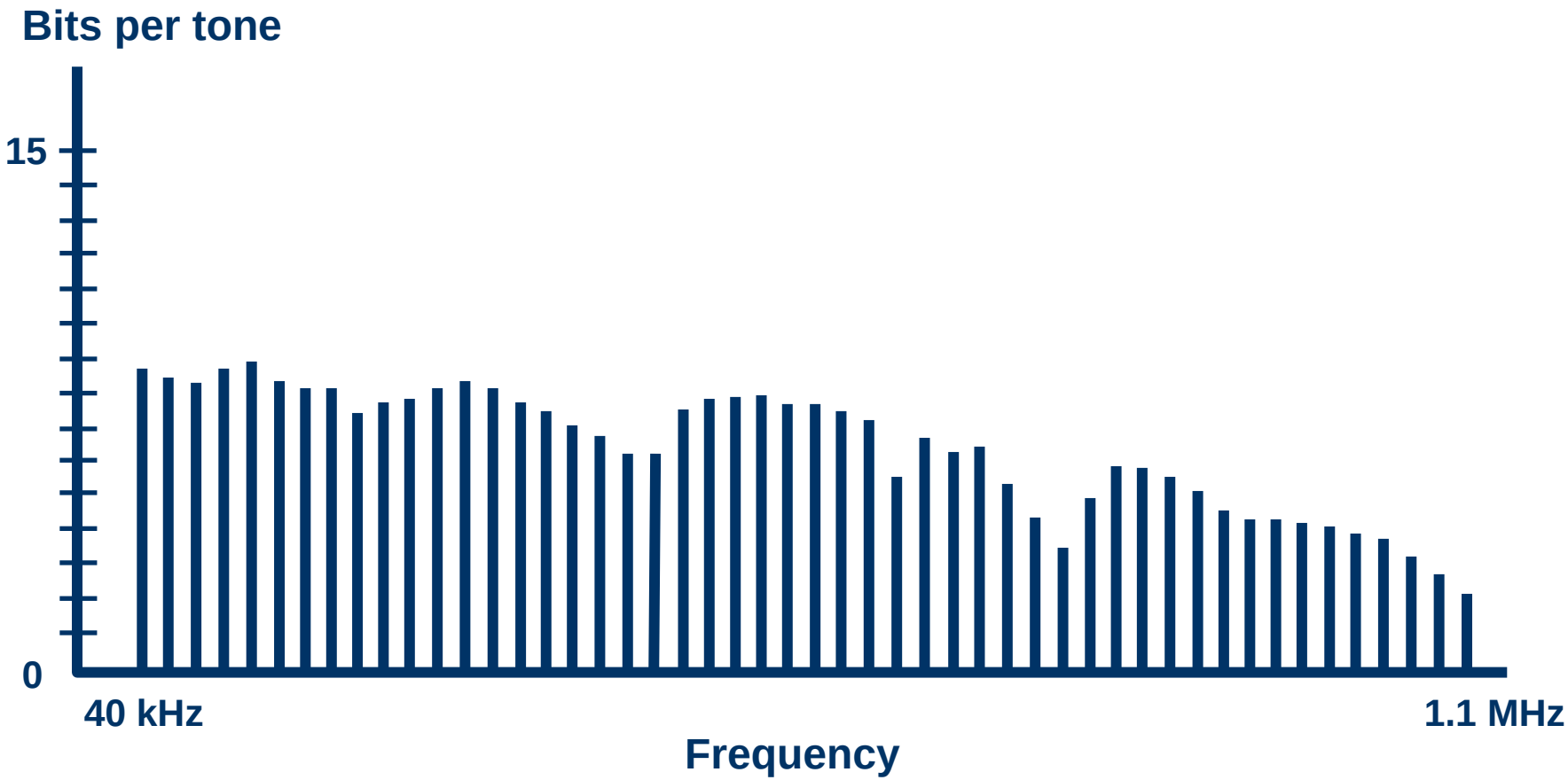
ADSL and DMT (Discrete Multi Tone)



- Worldwide standard line code for ADSL
- Wideband variable spectrum signal
- Bit swapping helps to adapt to loop problems
- Maintains BER <10^{-7}
- Many ways of carrying IP over ATM

- 256 Carrier tones (512 for ADSL2+)
- Each tone carries a QAM signal
- 4.3125 kHz/tone
- 4096 baud/tone
- Up to 15 bits/Baud (bits/tone)
- 0 to 61.440 bits/second/tone

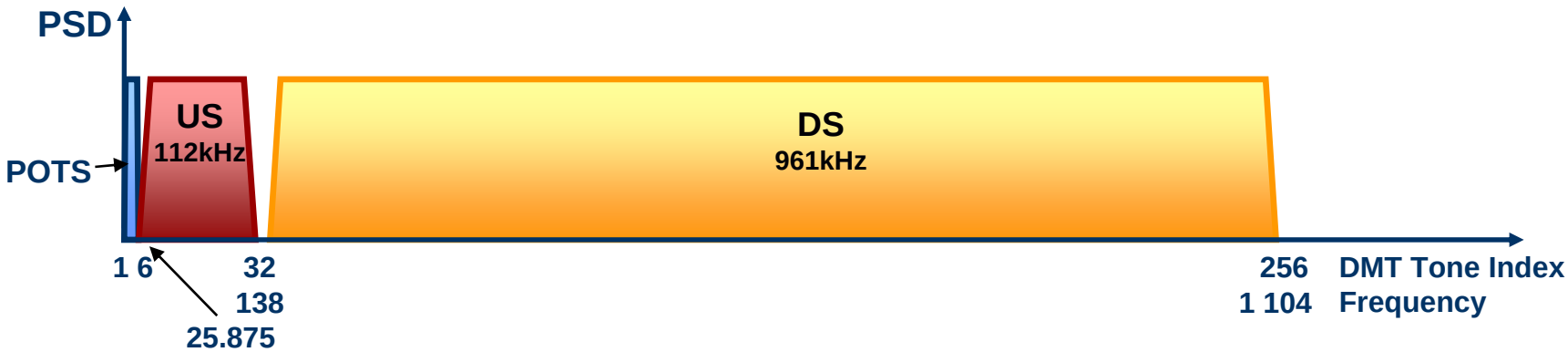
Signal to Noise Ratio (SNR) and DMT



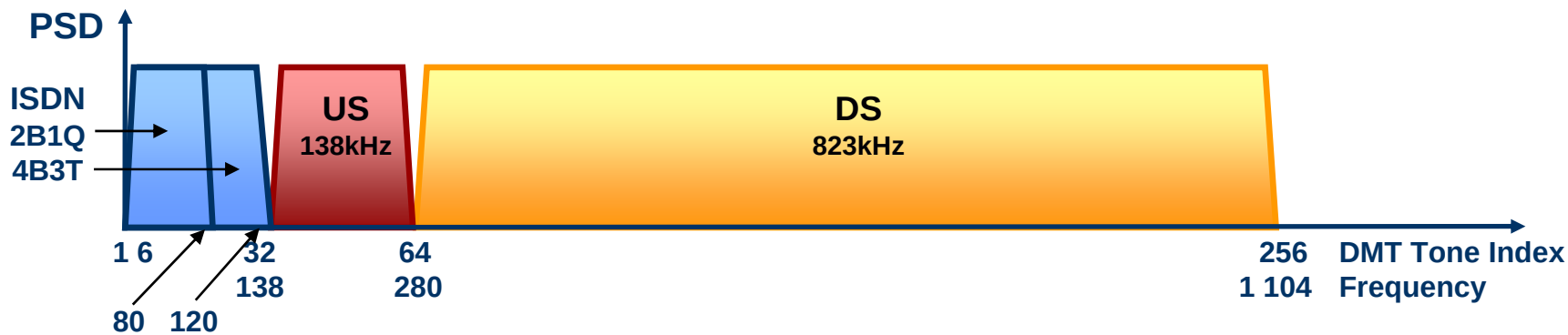
ADSL over POTS vs. ADSL over ISDN

ITU-T G.992.1 Annex A vs. Annex B

ITU-T G.992.1 Annex A, AoPOTS, Non-overlapped spectrum (FDM)



ITU-T G.992.1 Annex B, AoISDN, Non-overlapped spectrum (FDM)



ADSL2 and ADSL2+

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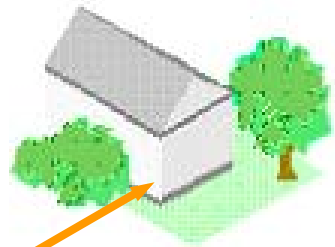
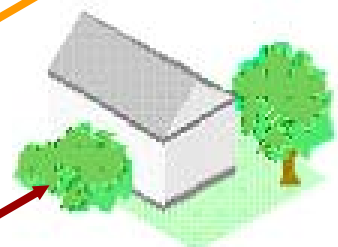
The ADSL2 and ADSL2+ standards improve on the original ADSL by offering higher downstream data rates and longer reach

ADSL2 provides downstream data rates of more than 12 Mbit/s, while extending ADSL's reach about 200m

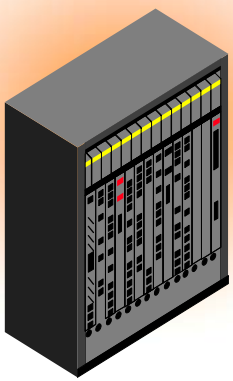


Home Office with ADSL2



Home Office with ADSL2+

Central Office



ADSL2 DSLAM

ADSL2+ provides downstream data rates of 25 Mbit/s for loops up to 1,5 km long by doubling the bandwidth used to carry traffic (up to 2.2 MHz)

CVoDSL

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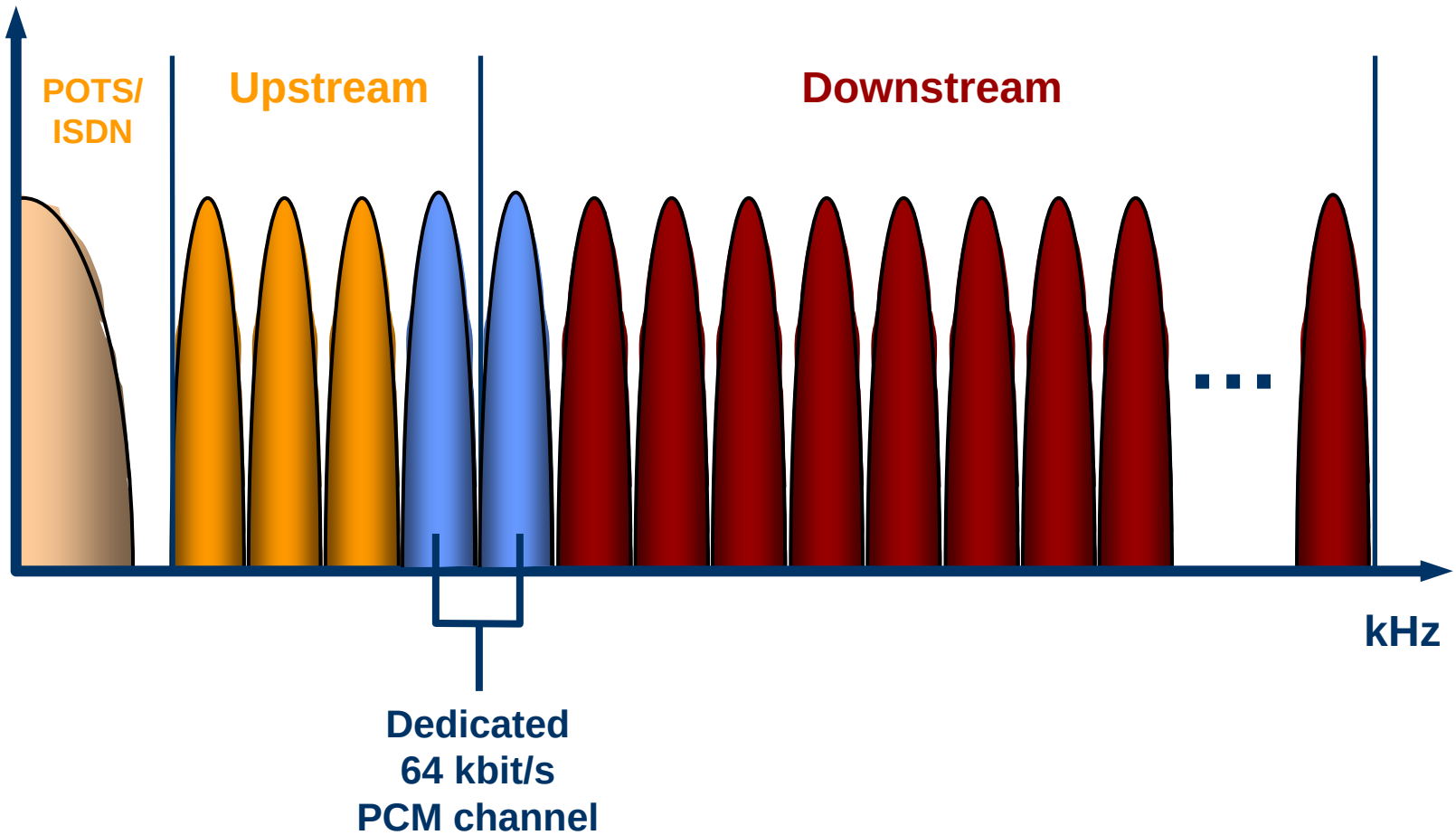
– en del af mercantec



ADSL2+ Doubles the Downstream Bandwidth

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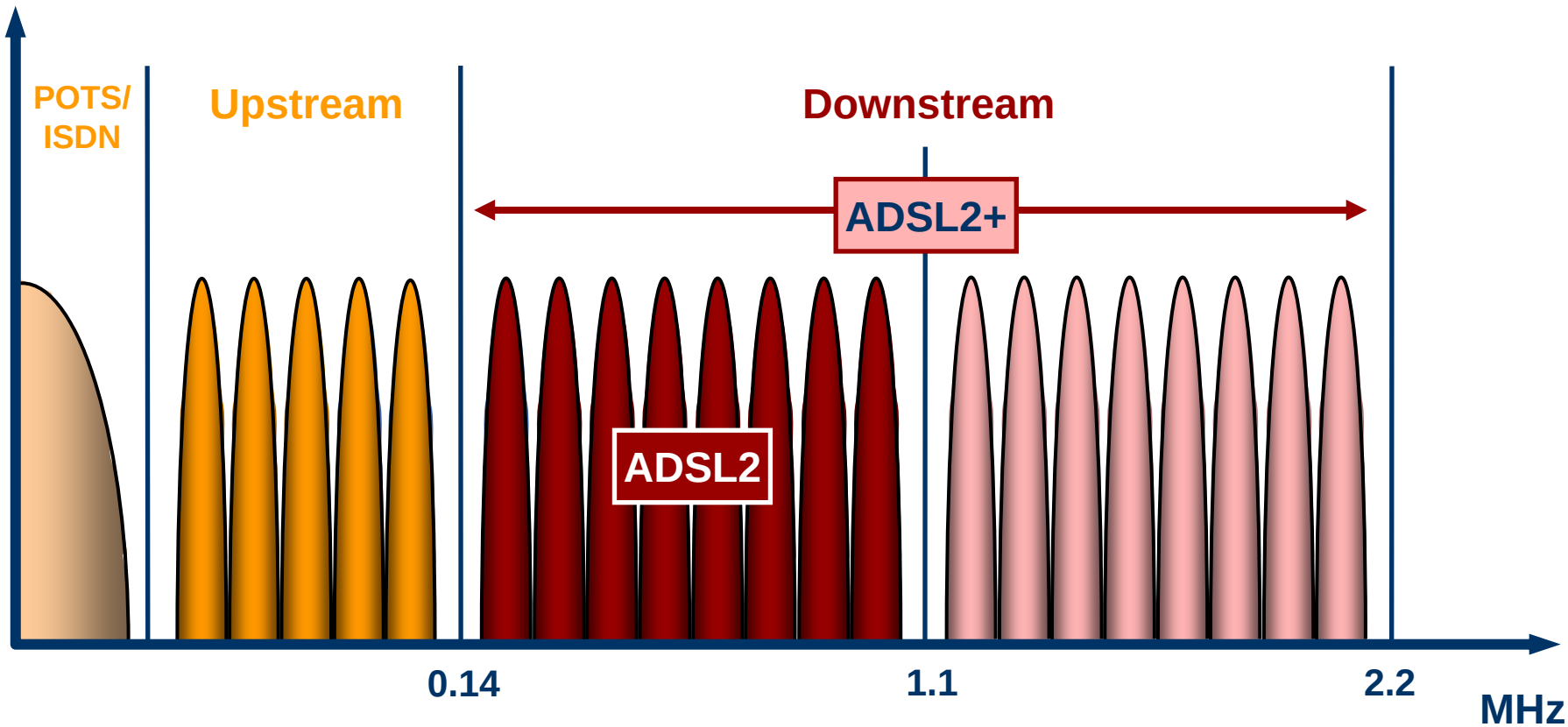
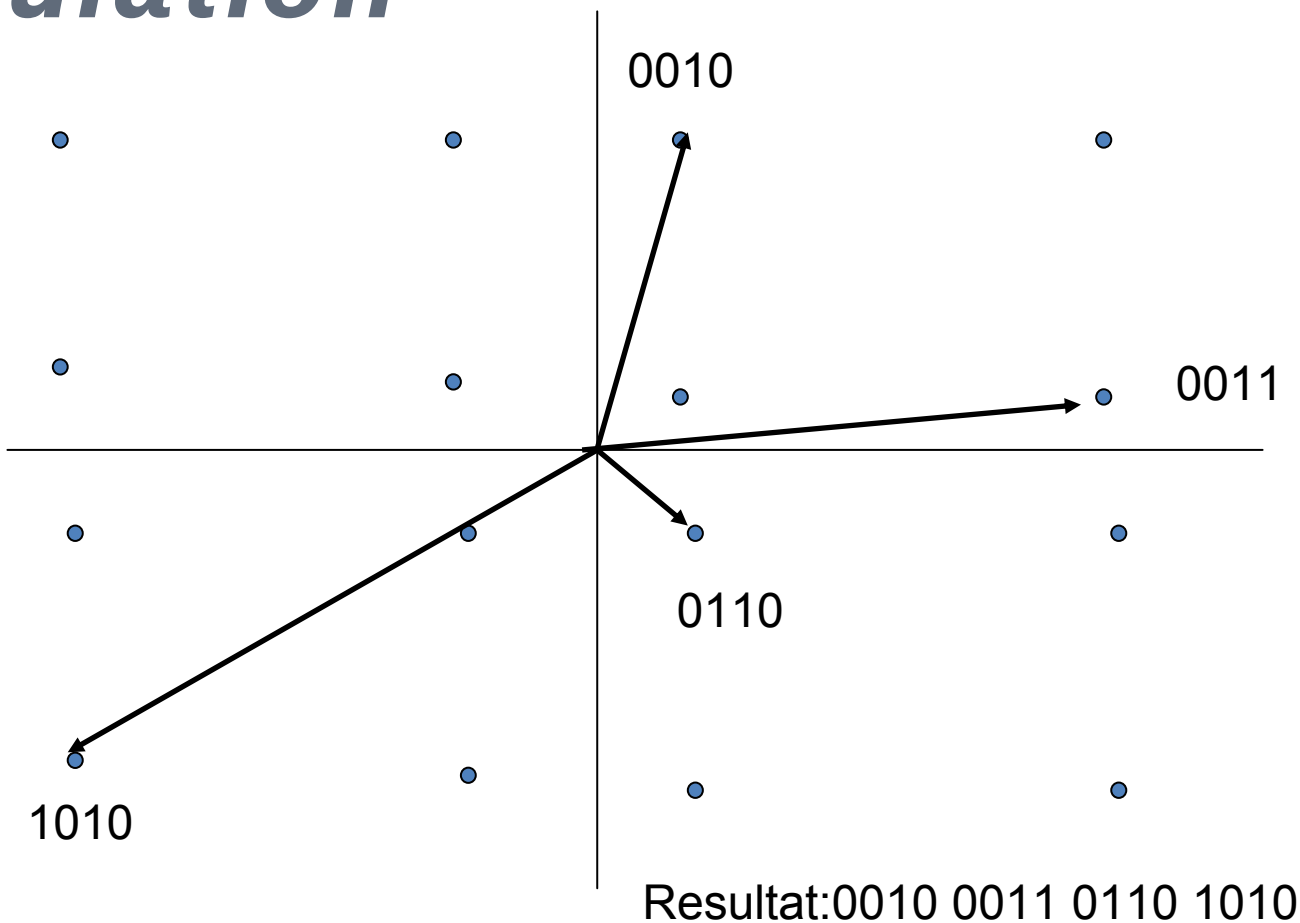
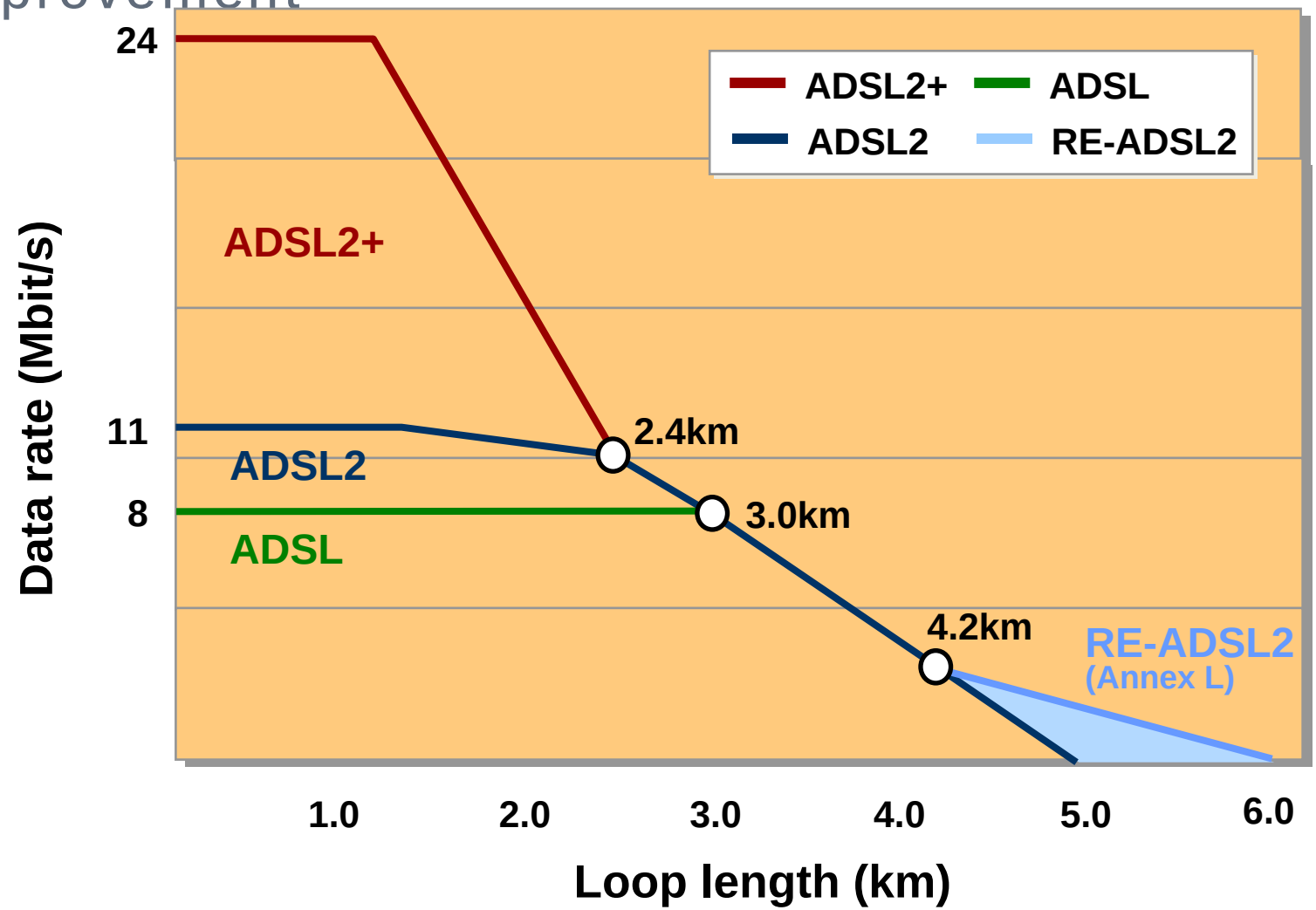
– en del af mercantec+



QAM
Quadrature amplitude modulation



ADSL2, ADSL2+ and RE-ADSL2 vs. ADSL rate and reach improvement



Copper wire characteristics

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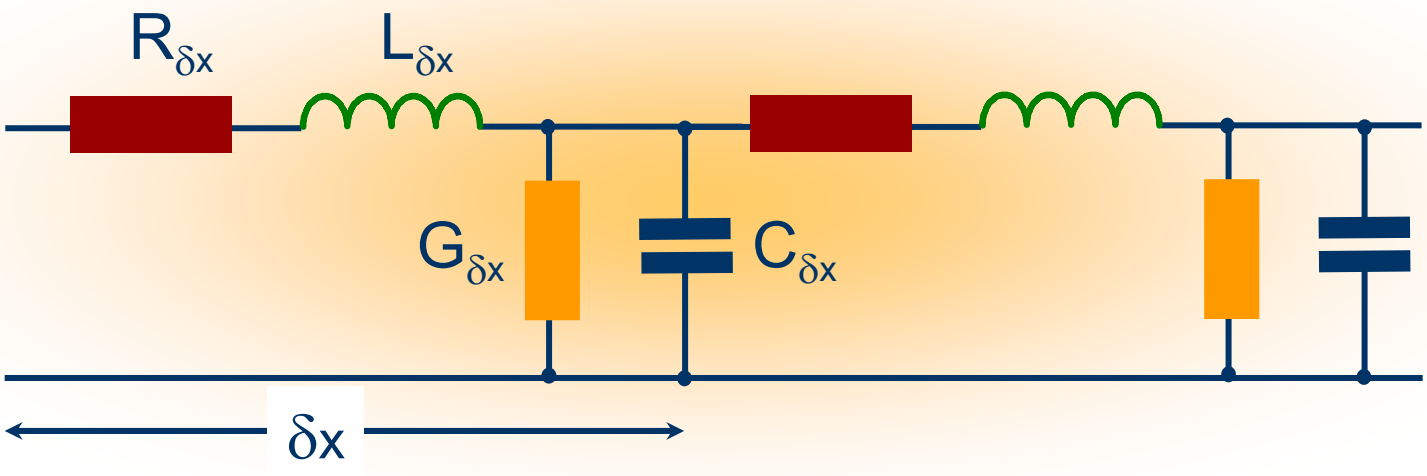
rcantec+

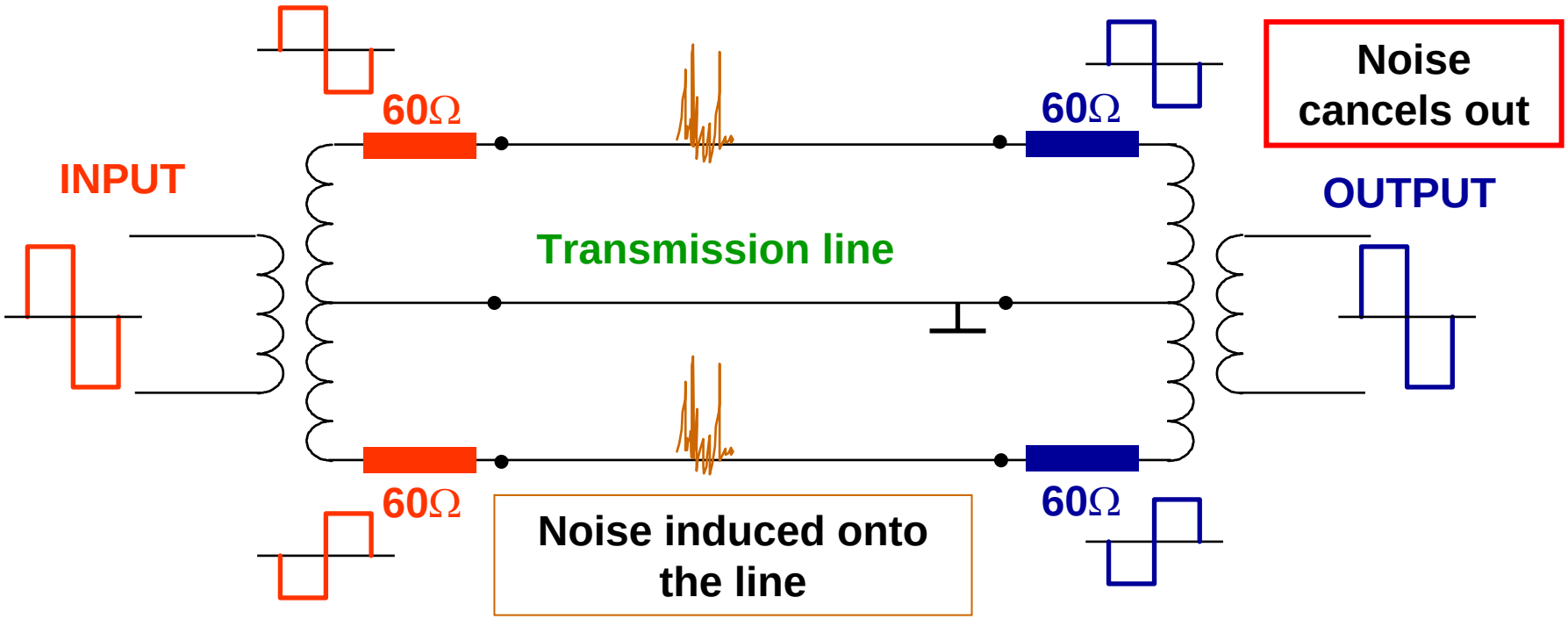
Twisted Pair Lines

Typical values per km

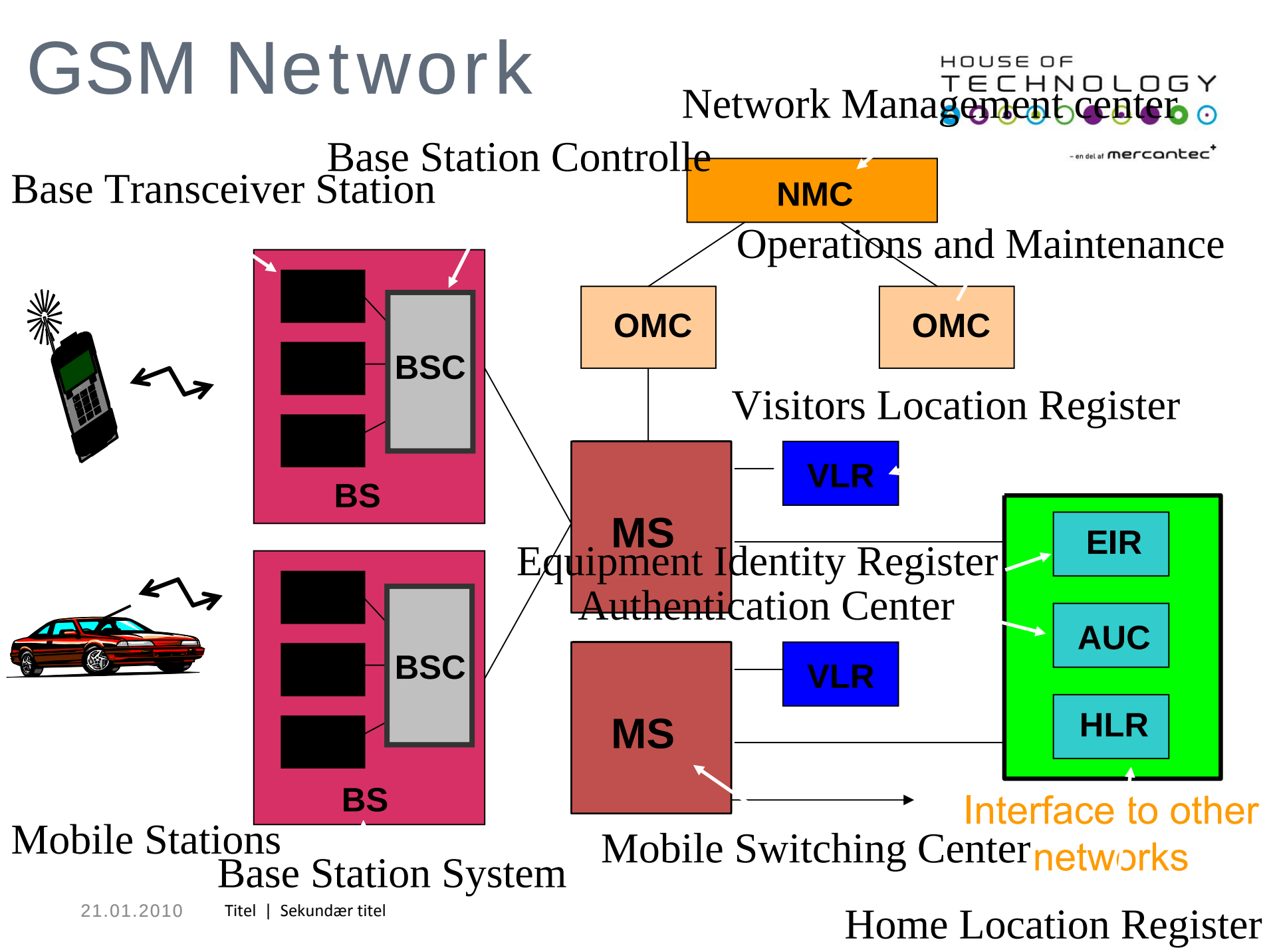
Capacitance: 30 to 60 nF
Resistance: 100 ohms
Inductance: 0.5 to 1 mH
Conductance: > 5M ohms



Balanced line

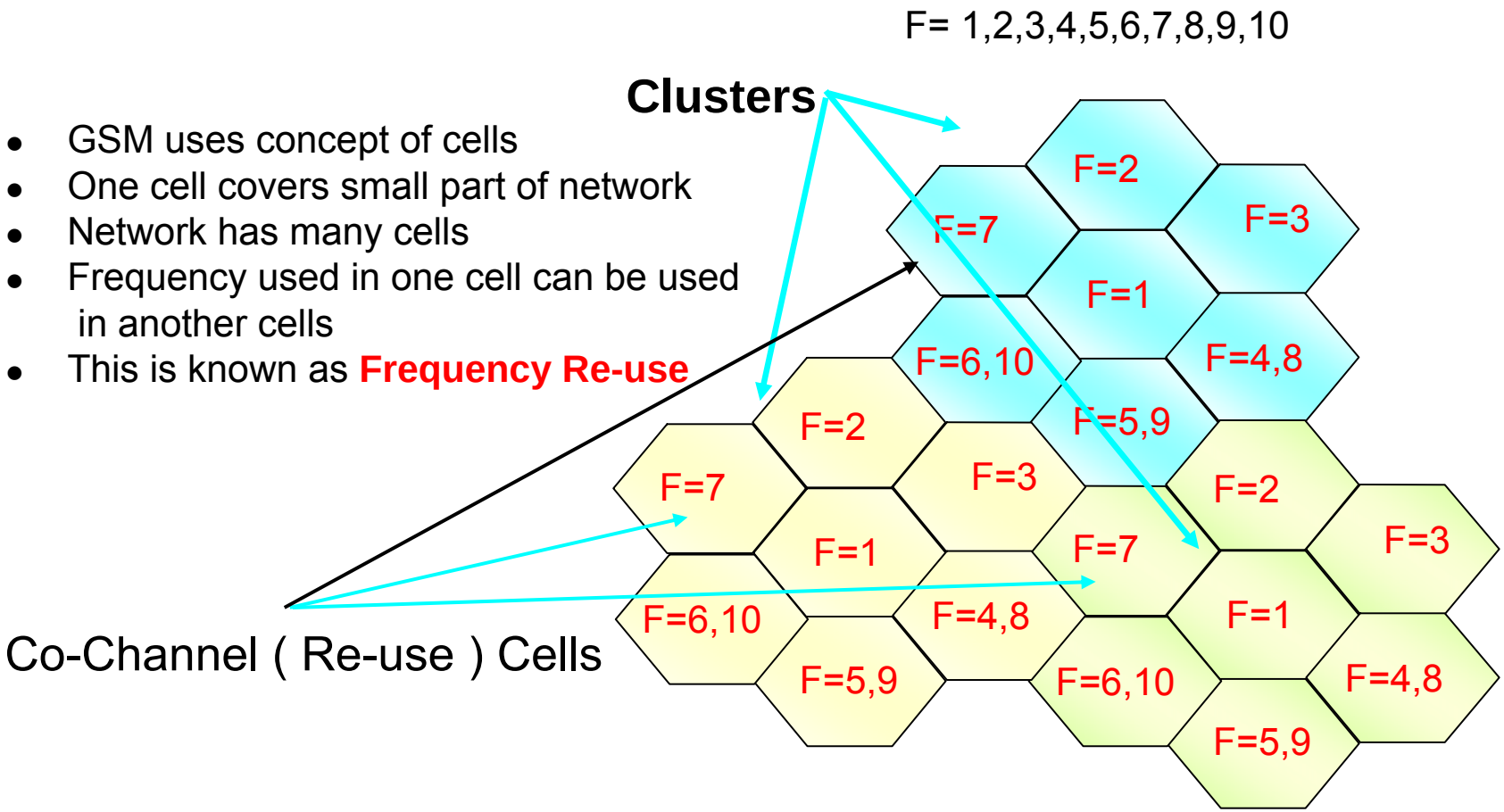


GSM Network


Network Management center
Base Station Controlle
Base Transceiver Station
NMC
Operations and Maintenance
OMC
OMC
BSC
BS
Visitors Location Register
VLR
MS
Equipment Identity Register
Authentication Center
EIR
AUC
HLR
BSC
BS
VLR
MS
Interface to other networks
Mobile Stations
Base Station System
Mobile Switching Center
Home Location Register

Frequency Reuse

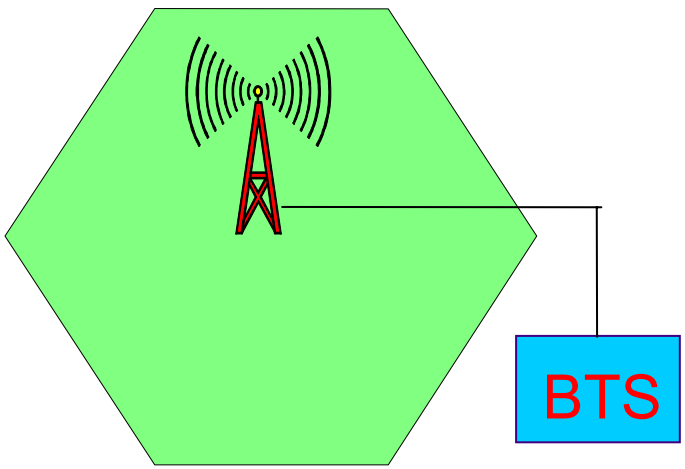
- GSM uses concept of cells
- One cell covers small part of network
- Network has many cells
- Frequency used in one cell can be used in another cells
- This is known as **Frequency Re-use**



Cell Formats

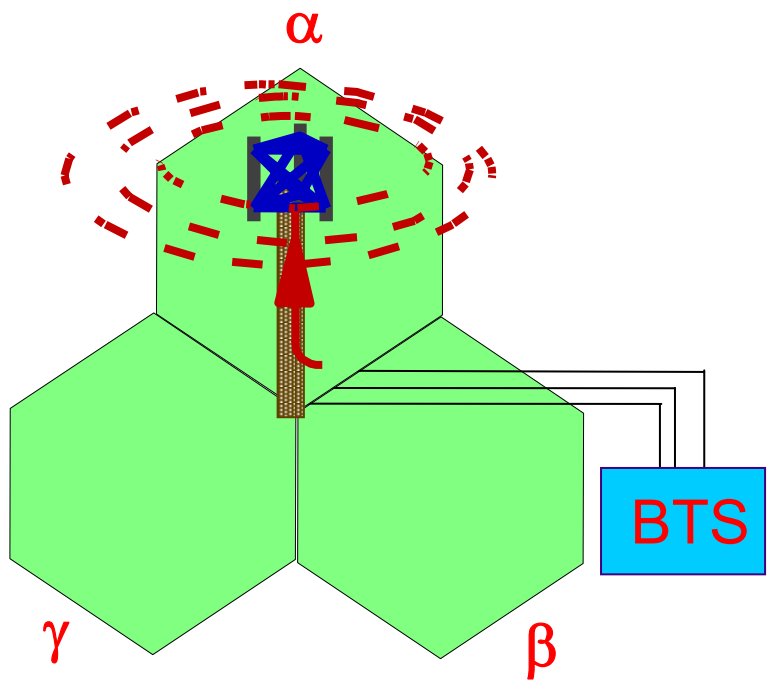
Omni-directional Cell

1x BCH
1x BSIC



Sectored Cell

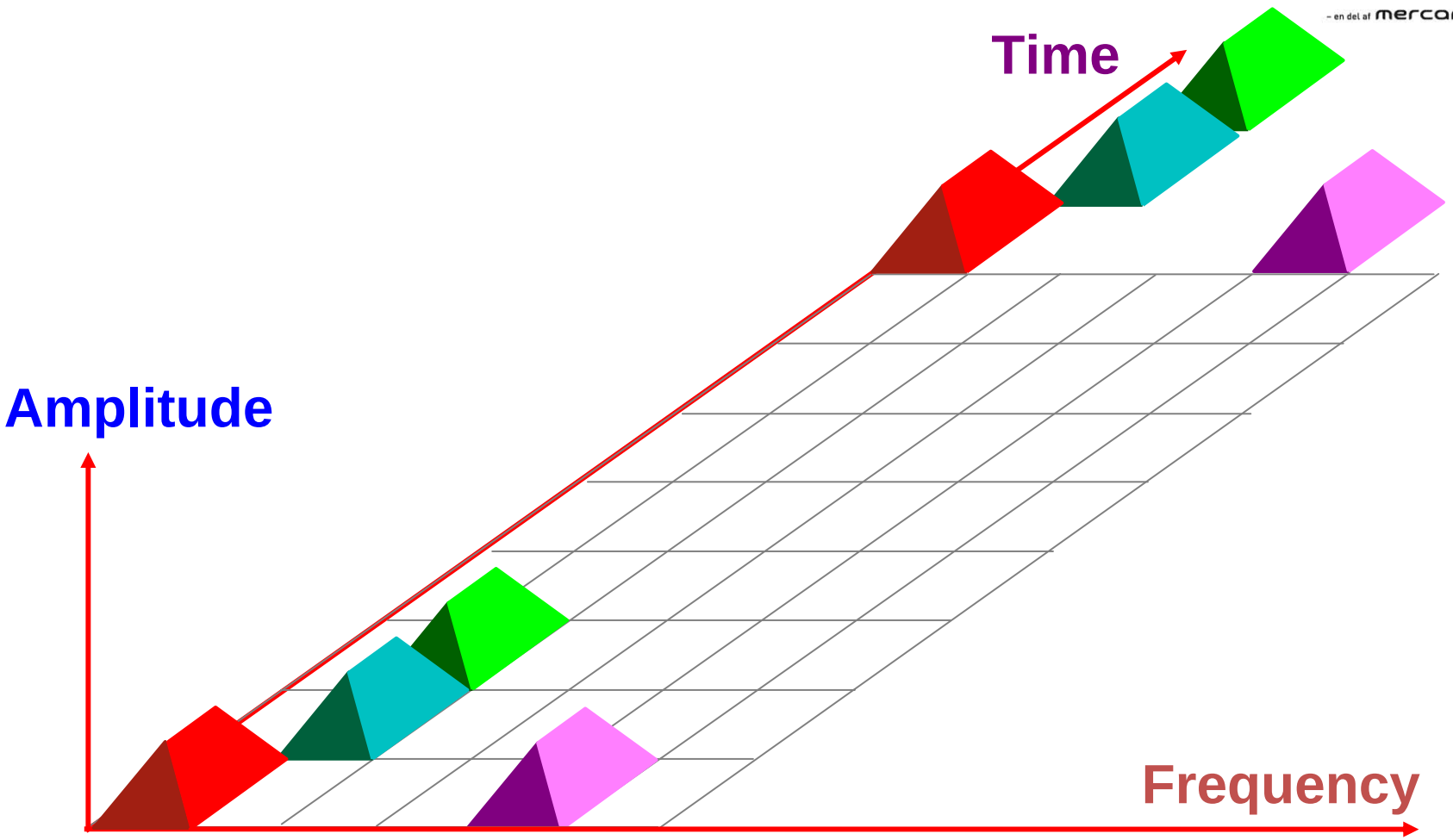
3x BCH
3x BSIC



GSM Channel Plans

	Phase 1 GSM900	Phase 2 GSM900	Phase 1 DCS1800	Phase 2 DCS1800	PCS1900
Uplink Frequency Range	890 to 915MHz	880 to 915MHz	1710 to 1785MHz	1710 to 1785MHz	1850 to 1910MHz
Downlink Frequency Range	935 to 960MHz	925 to 960MHz	1805 to 1880MHz	1805 to 1880MHz	1930 to 1990MHz
ARFCN Range	1 – 124	0 – 124 and 975 – 1023	512 – 885	512 – 885	512 – 810
Tx/Rx Spacing (MHz)	45	45	95	95	80

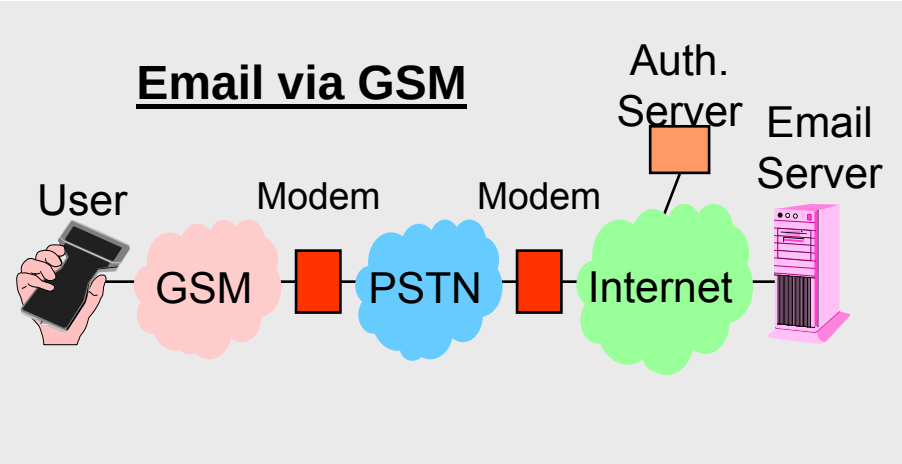
GSM FDMA and TDMA

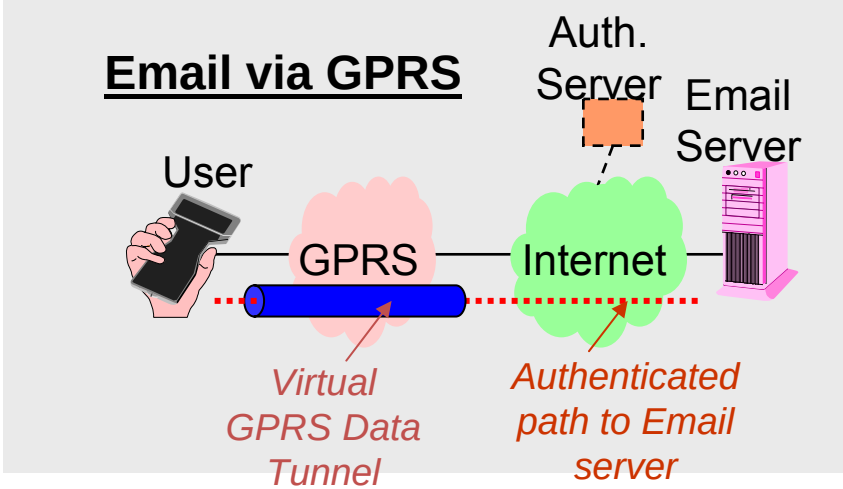


GSM & GPRS & HSCSD & WCDMA

- GSM – Groupe speciale mobile “Circuit switch”
- HSCSD - High Speed Circuit Switched Data
- GPRS - General Packet Radio Service
- WCDMA – Packet switched

GSM v/s GPRS





INITIAL CALL PROCESS	TIME (s)
• GSM Call	4
• TrainModem	30
• Login and Authenticate	11
• Download mail	180
Total	**3 min 45s**
SUBSEQUENT CALL	
• **Repeat Above**	**3 min 45s**

INITIAL CALL PROCESS	TIME (s)
• GPRS Call	4
• Login and Authenticate	11
• Download mail	180
Total	**3 min 15s**
SUBSEQUENT CALL	
• **Not applicable – Permanent Virtual Circuit**	**0min 0s**