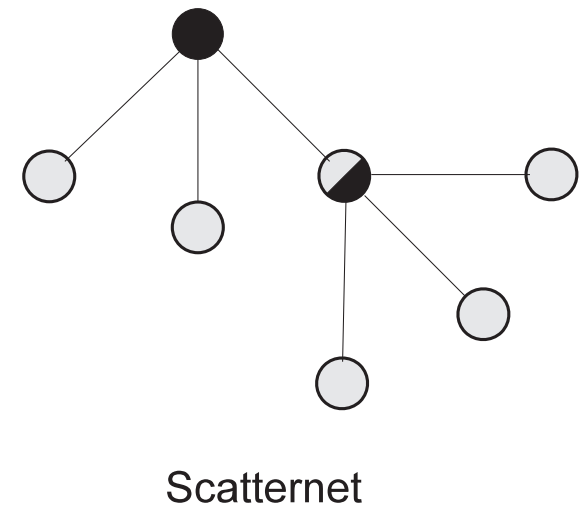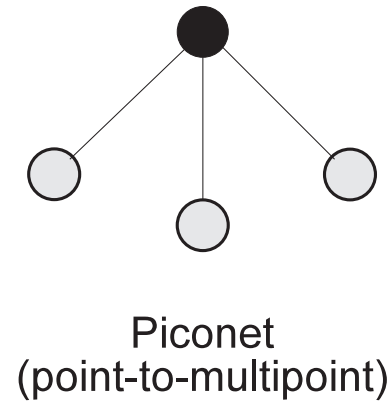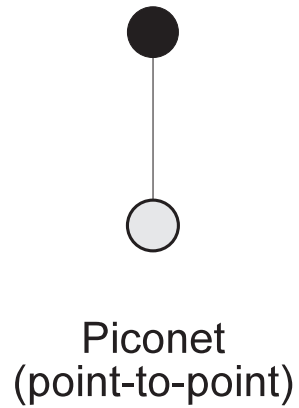# Lokální sítě
(10)

Jan Janeček

katedra počítačů

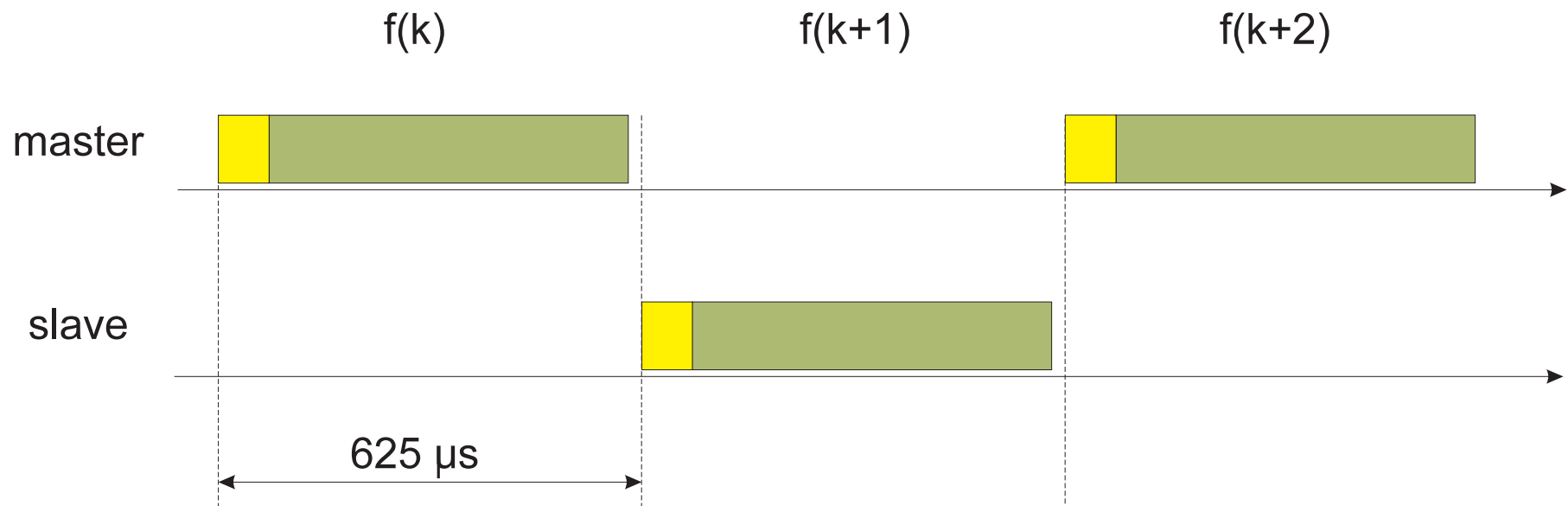České vysoké učení technické v Praze

Wireless networks

- Bluetooth

- HiperLAN
  - ○ HiperLAN
  - ○ HiperLAN-II

- WiMAX
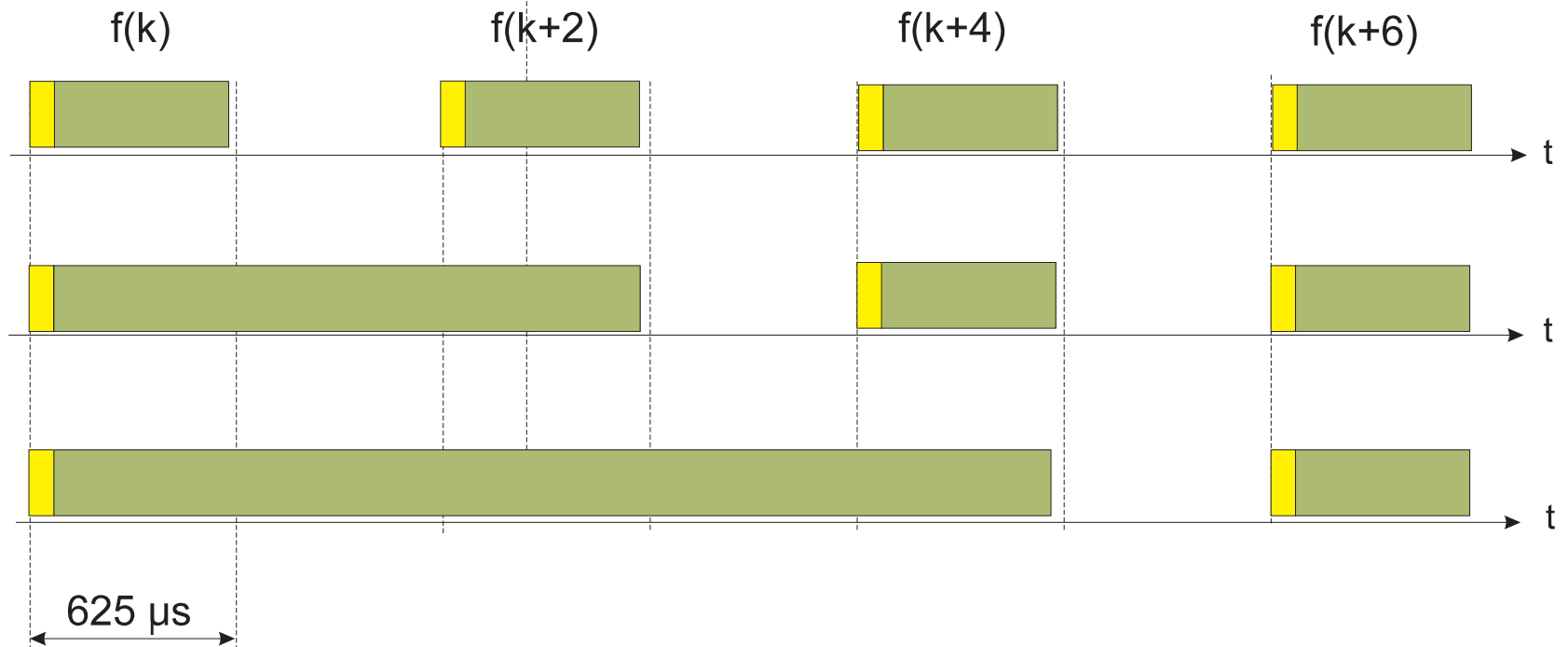 - ○ IEEE 802.16
  - ○ IEEE 802.16a
  - ○ IEEE 802.16e

Bluetooth - network

Piconet
(point-to-point)

Piconet
(point-to-multipoint)
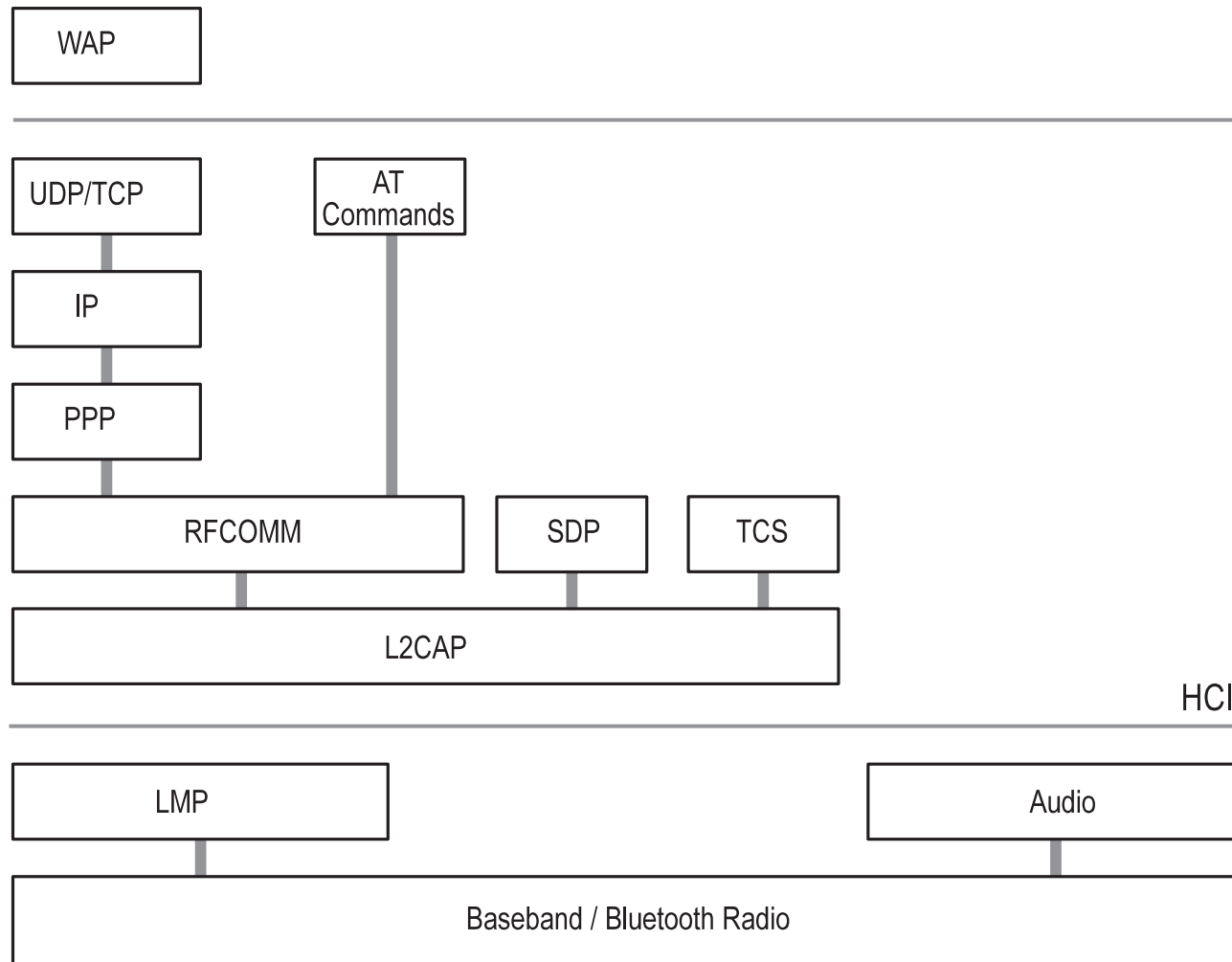
Scatternet

Bluetooth - MAC

Bluetooth - MAC

Bluetooth - protocols

HiperLAN

European standard (ETSI) for Radio LAN

Europe: 5.15 - 5.25 (5.3) GHz band

US :   5.15 - 5.35 GHz (50 mW)
           5.725 - 5.825 GHz (1 W)

Infrastructure / ad hoc networks

Support for

      neighbourhood discovery

      time bounded medium access

      power saving support

      security

HiperLAN - technologies

HiperLAN Type 1	HiperLAN Type 2	HiperAccess (Type 3)	HiperLink (Type 4)
Wireless LAN	Wireless ATM	Wireless Local Loop	Wireless Point-to-Point
5 GHz	5 GHz	5 GHz	17 GHz
23.5 Mbps	~ 20 Mbps	~ 20 Mbps	~ 155 Mbps

HiperLAN - technologies

LAN/ATM switch

HiperLAN/1
5 GHz

HiperLink
17 GHz

base station

base station

base station

HiperLAN/2
5 GHz

HiperLAN/2
5 GHz

HiperLAN/2
5 GHz

HiperAccess
5 GHz

end point

HiperLAN - MAC

data packet

MAC Header	Low Rate Header 35 bits (560 bits)	Sync Sequence 450 bits	Data Block 496 bits	Data Block 496 bits

1.5 Mb/s   23.5 Mb/s

acknowledgement

without MAC header	Low Rate Header 23 bits (368 bits)

1.5 Mb/s
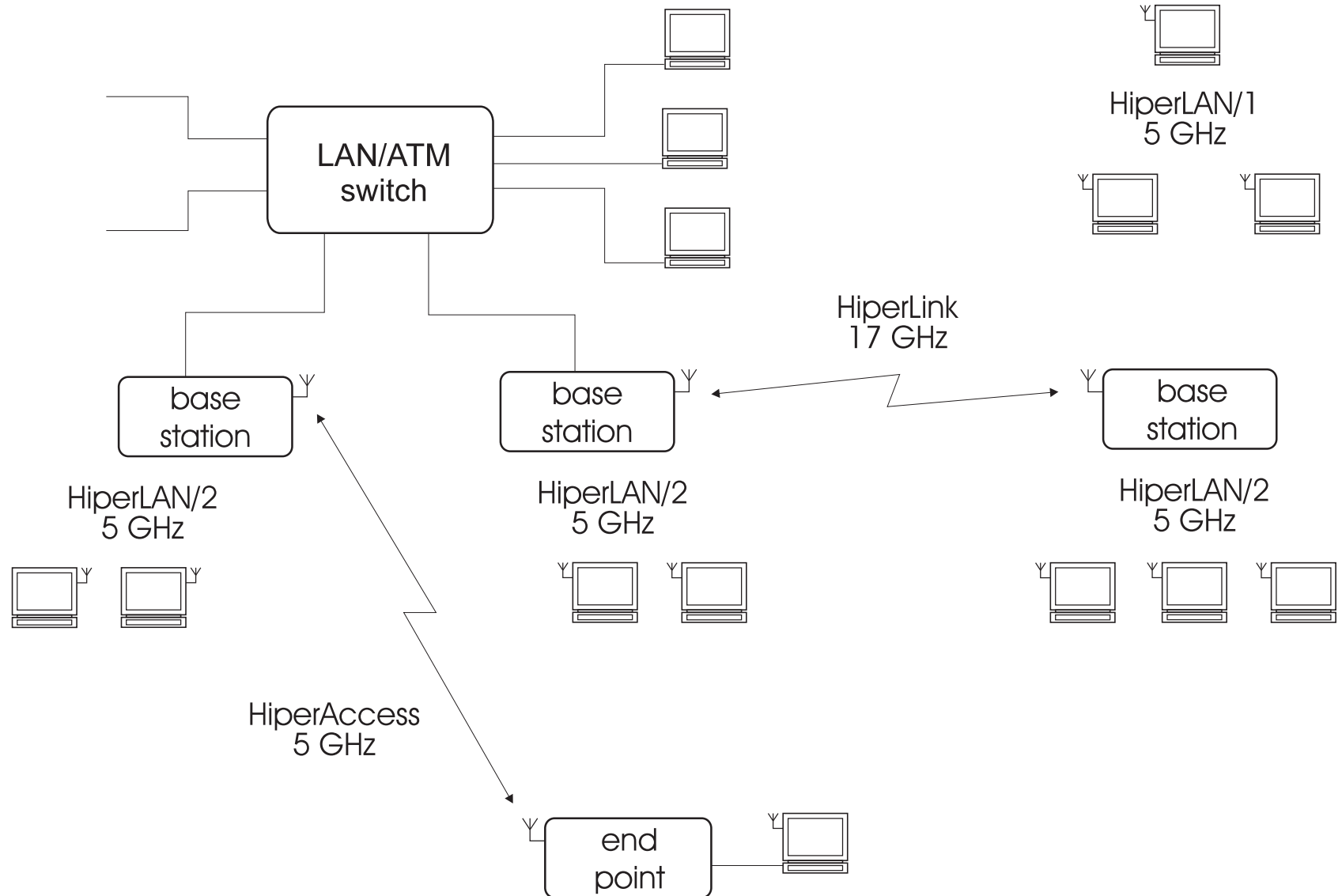
HiperLAN - MAC

CAC - Channel Access Control

Synchronized Channel Access
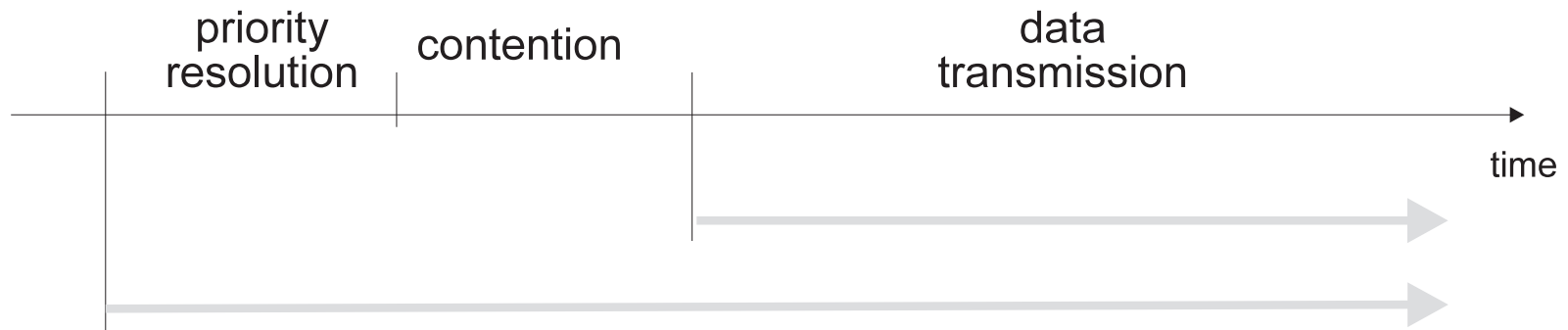
NPMA - Non-preemptive Priority Multiple Access

non-preemptive priority resolution
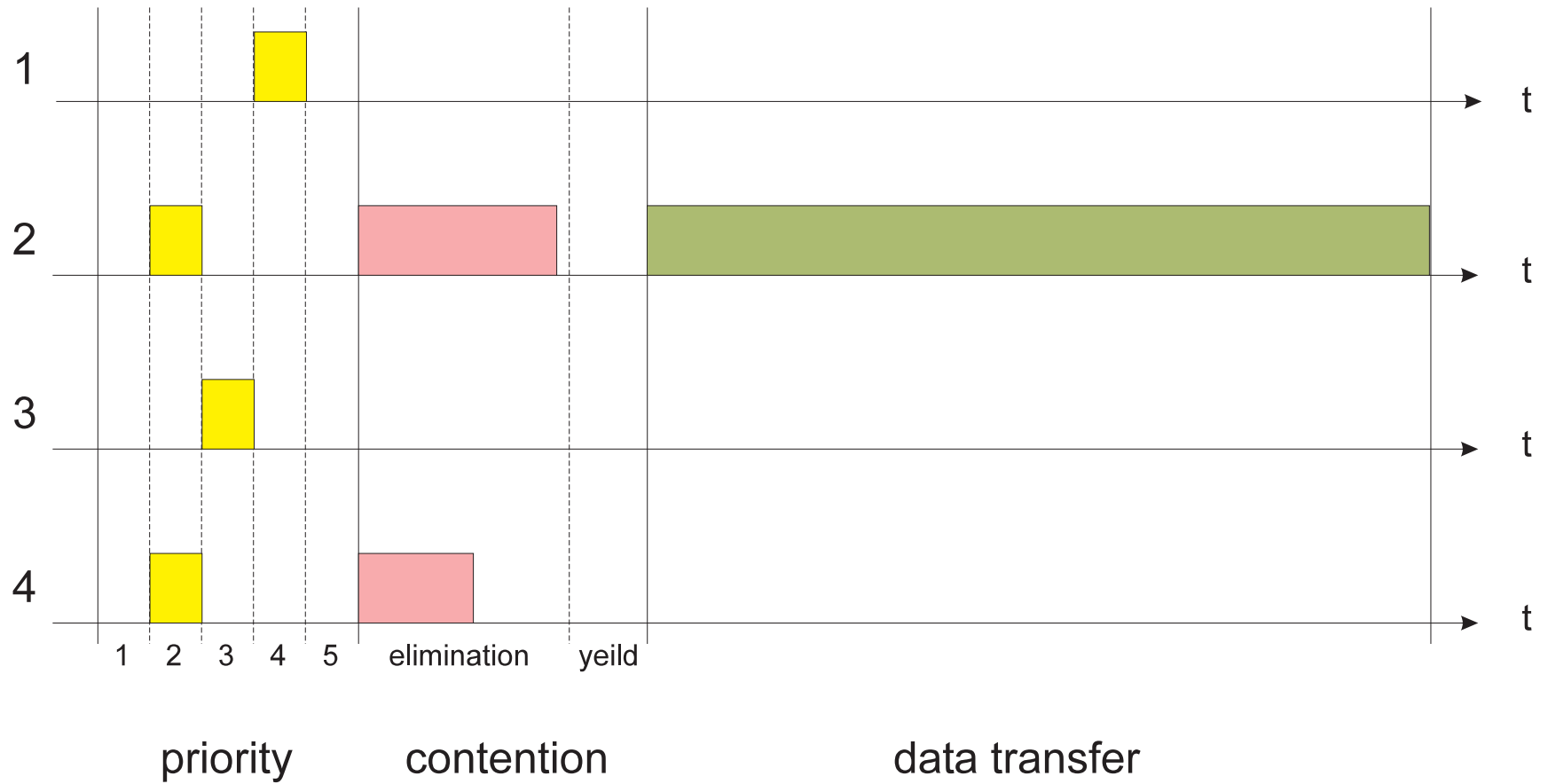
p = [0,4], depends on application priority and time limit

statistically fair contention resolution

$i = [1,12], P(i) = 0.5^i$

random selection (backoff) among winning stations

HiperLAN - MAC

HiperLAN - power management
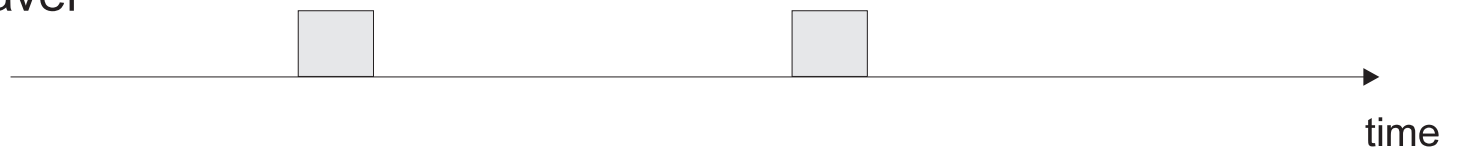
Power management

p-saver

declares wake-up pattern

p-supporter

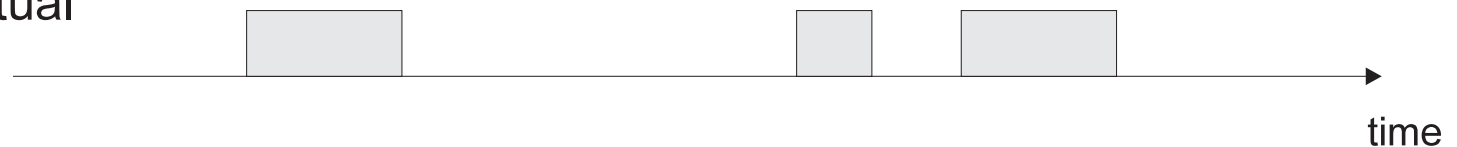declares deffered multicast pattern

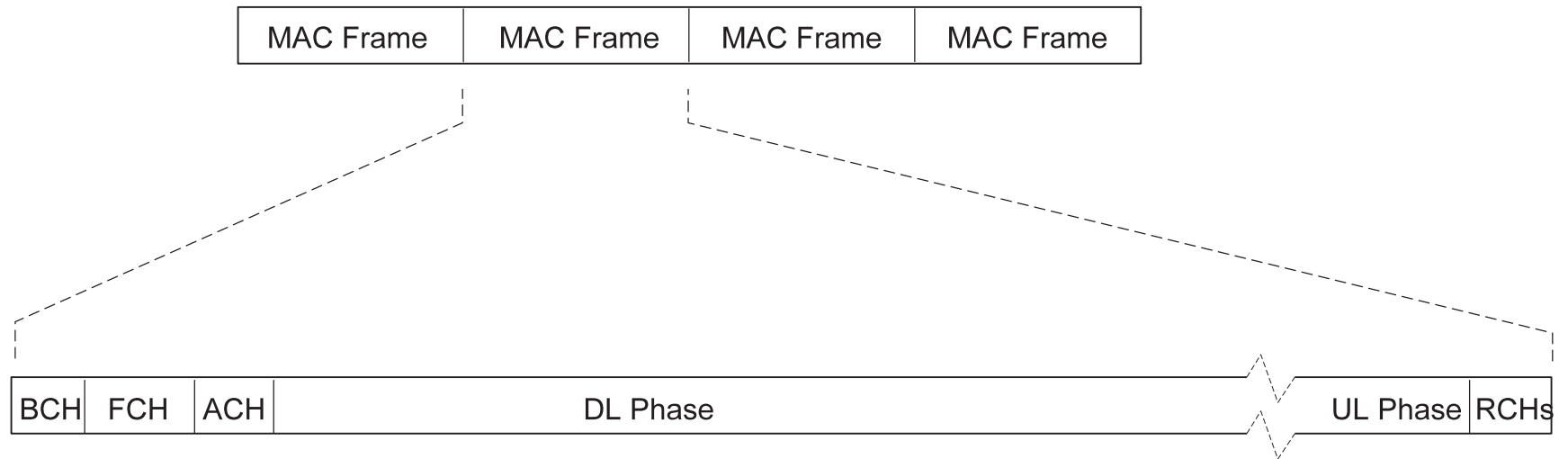# HiperLAN-II - MAC

MAC Frame	MAC Frame	MAC Frame	MAC Frame

BCH	FCH	ACH	DL Phase	UL Phase	RCHs

HiperLAN - MAC

logical channels

LCCH   SBCH   DCCH   UDCH

BCH   FCH   ACH   SCH   LCH

transport channels

HiperLAN - MAC

logical channels

ASCH   LCCH   DCCH   UDCH

RCH   SCH   LCH

transport channels
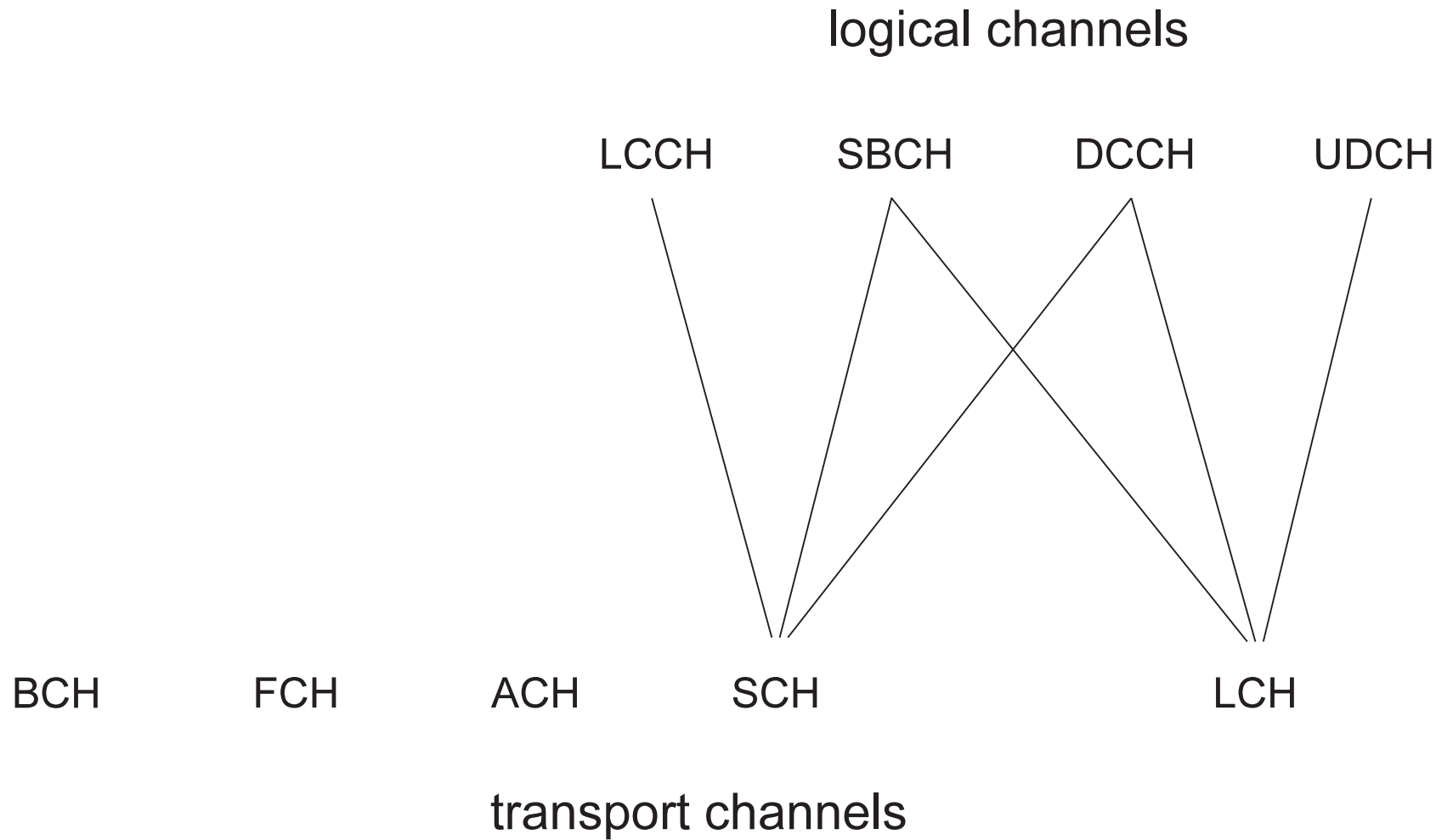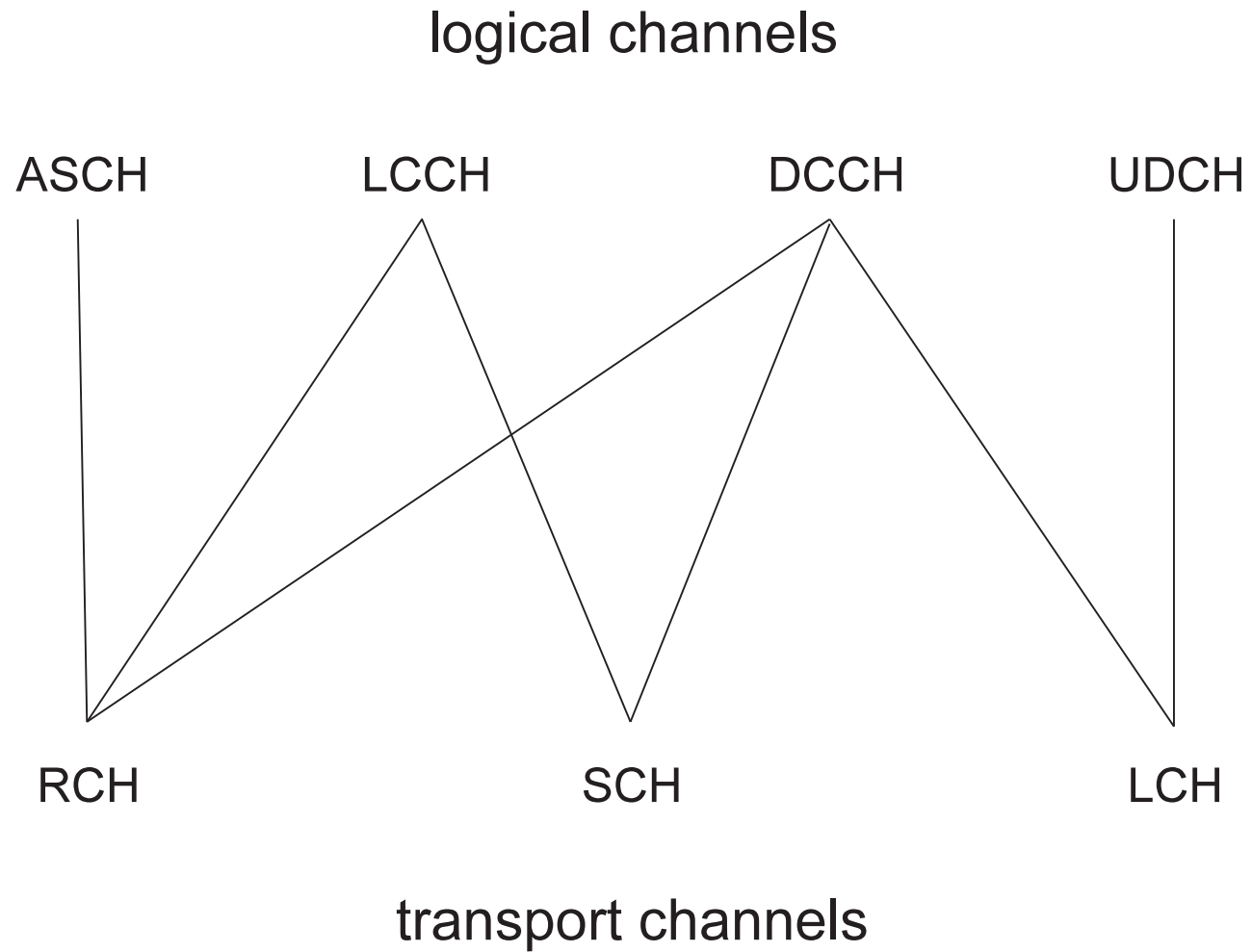
WiMAX

WMAN

Wireless Metropolitan Networks

FWA

Fixed Wireless Networks

BWA

Broadcast Wireless Networks

WiMAX

IEEE 802.16

10 - 66 GHz

Line-of-Sight (LOS) technology

134 Mb/s

IEEE 802.16a

2 - 11 GHz

Non Line-of-Sight (NLOS) technology

40 - 70 km, up to 75 Mb/s

IEEE 802.16e

2 - 6 GHz

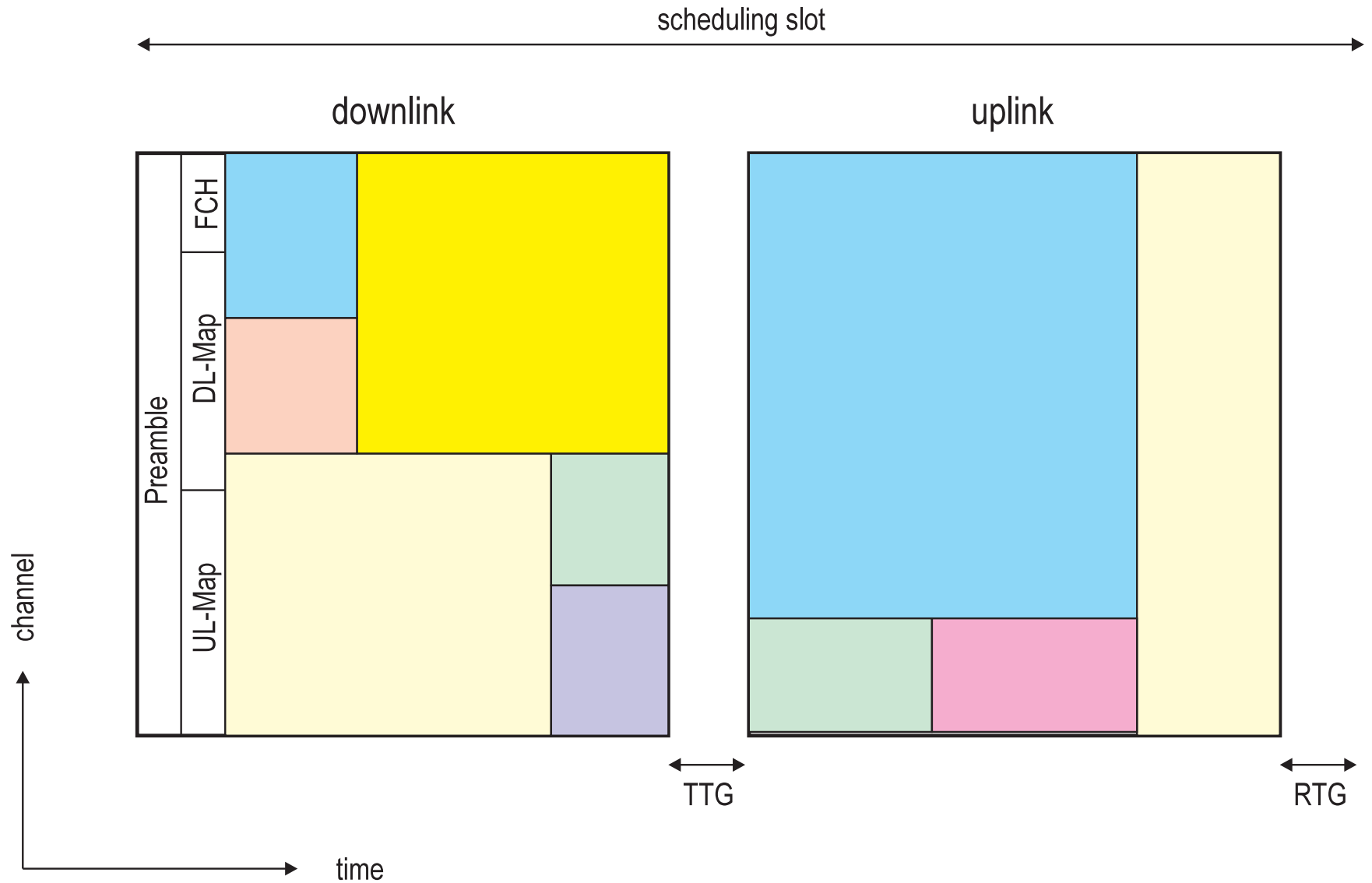adds mobility up to 150 km/h

15 Mb/s

WiMAX - technology

OFDM

FDD / TDD cobination

channels 1.5 - 20 MHz

Bandwidth	1.25	2.5	5	10	20	MHz
Sampling	1.429	2.875	5.714	11.429	22.857	MHz
FFT size	128	256	512	1024	2048	

WiMAX - OFDM

WiMAX - QoS

Unsolicited Grant Service

VoIP

Real-time Polling Service

video, teleconferencing

Non Real-time Polling Service

non-interactive multimedia

Best Effort Service

FTP, http