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WiMAX
Technology Status &
Standards Progress
Max Riegel
<maximilian.riegel@siemens.com>
Advanced Standardization
BBWF Venice, 2004-09-20
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Camera
Menu
Options

‘WiMAX’ is addressing a new market

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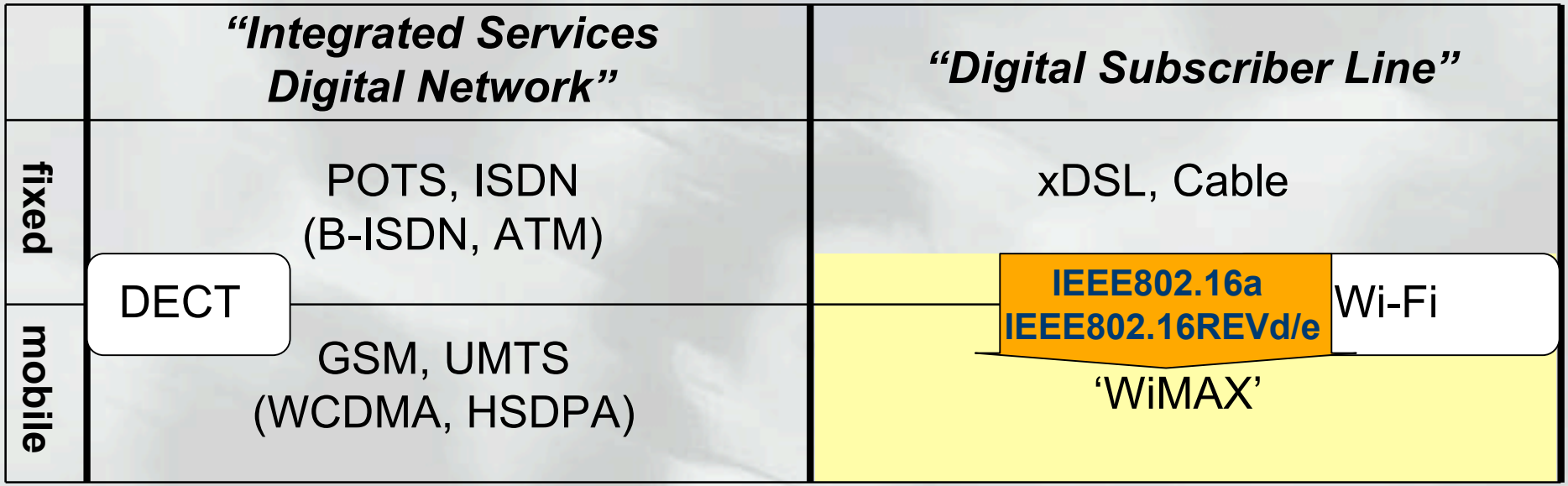
Telecommunication Market Segmentation:



- **End-to-end QoS**
- **Hard realtime (voice)**
  Defined traffic classes
- **End-to-end service delivery**
  - Voice, SMS, Gaming, Infotainment
- **Precise accounting, charging and billing**

- **Best effort, DIFFSERV enabled**
- **Interactive (http, mail)**
  Streaming, downloads
- **Access to the plain Internet**
  - Common web applications, email
- **Usage classes, flat-rate**

WiMAX Application Scenarios

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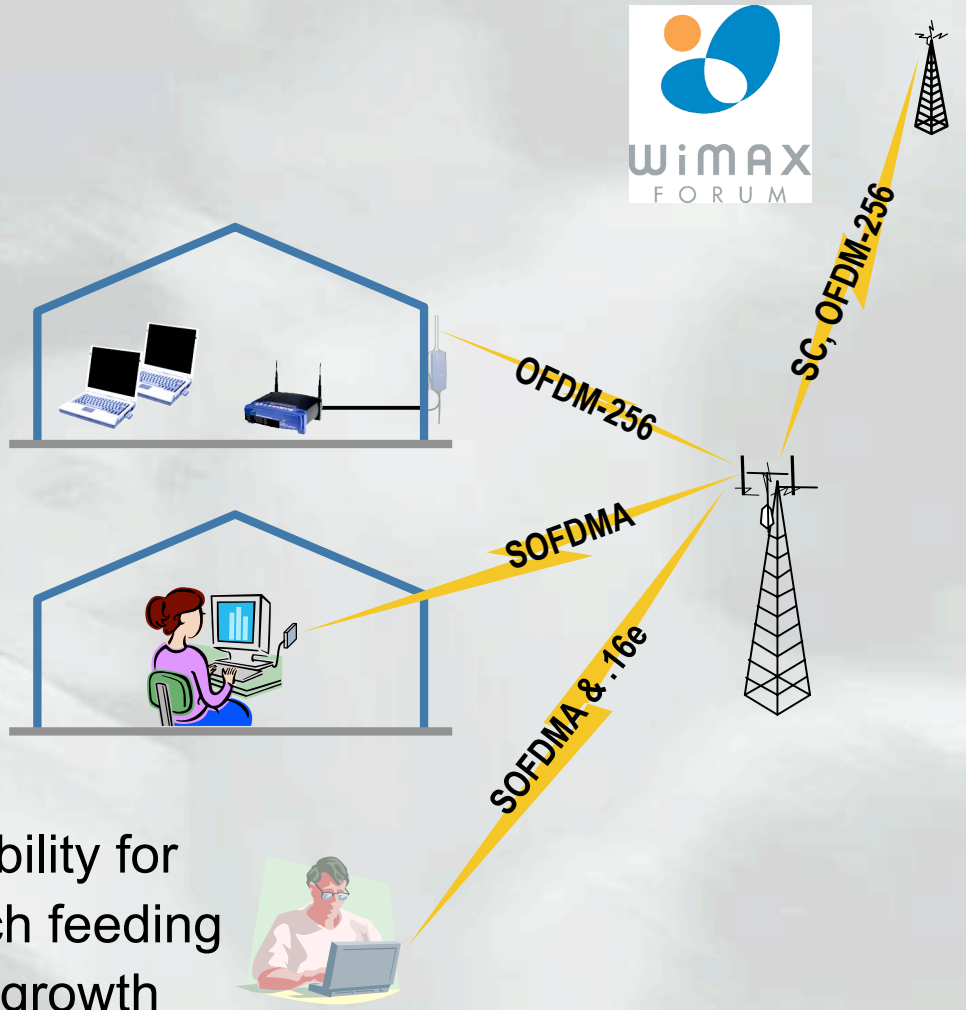
- **Backhaul feeding**
  PtP links for fixed infrastructure
  - Dedicated market w/ limited size
- **Fixed Wireless Access**
  Wireless local loop, hotspot feeding
  - Suffers from poor CPE handling
- **Nomadic Access (Hotzone)**
  Indoor CPE thanks to better radio
  CPE may be integrated into terminal
  - Most promising for mass market
- **Portable Access**
  Handover function enabling data mobility for road worriors, train feeding and coach feeding
  - Mobility enables persistant market growth



IEEE 802.16 – 2004: *'One standard fits all'*

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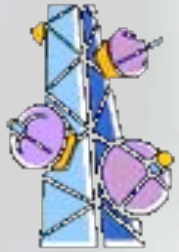

	Feeding	FWA	Cellular
Completed	December 2001	January 2003	June '04/Mobility mid '05
Spectrum	10 - 66 GHz	< 11 GHz	< 6 GHz
Channel Conditions	Line of Sight Only	Non Line of Sight	Non Line of Sight
Bit Rate	32 – 134 Mbps in 28MHz channel bandwidth	Up to 75 Mbps in 20MHz channel bandwidth	Up to 15 Mbps in 5MHz channel bandwidth
Modulation	Single Carrier QPSK, 16QAM, 64QAM	OFDM 256 sub-carriers QPSK, 16QAM, 64QAM	1x Scalable OFDMA QPSK, 16QAM, 64QAM
Mobility	Fixed	Fixed	Portable Mobile (up to 120 km/h)
Channel Bandwidths	20, 25 and 28 MHz	Scalable 1.5 to 20 MHz	Scalable 1,25 to 20 MHz
Typical Cell Radius	2-5 km	7 to 10 km Max range 50 km	1-5 km

IEEE 802.16 Broadband Wireless Access
Standards and Standardization

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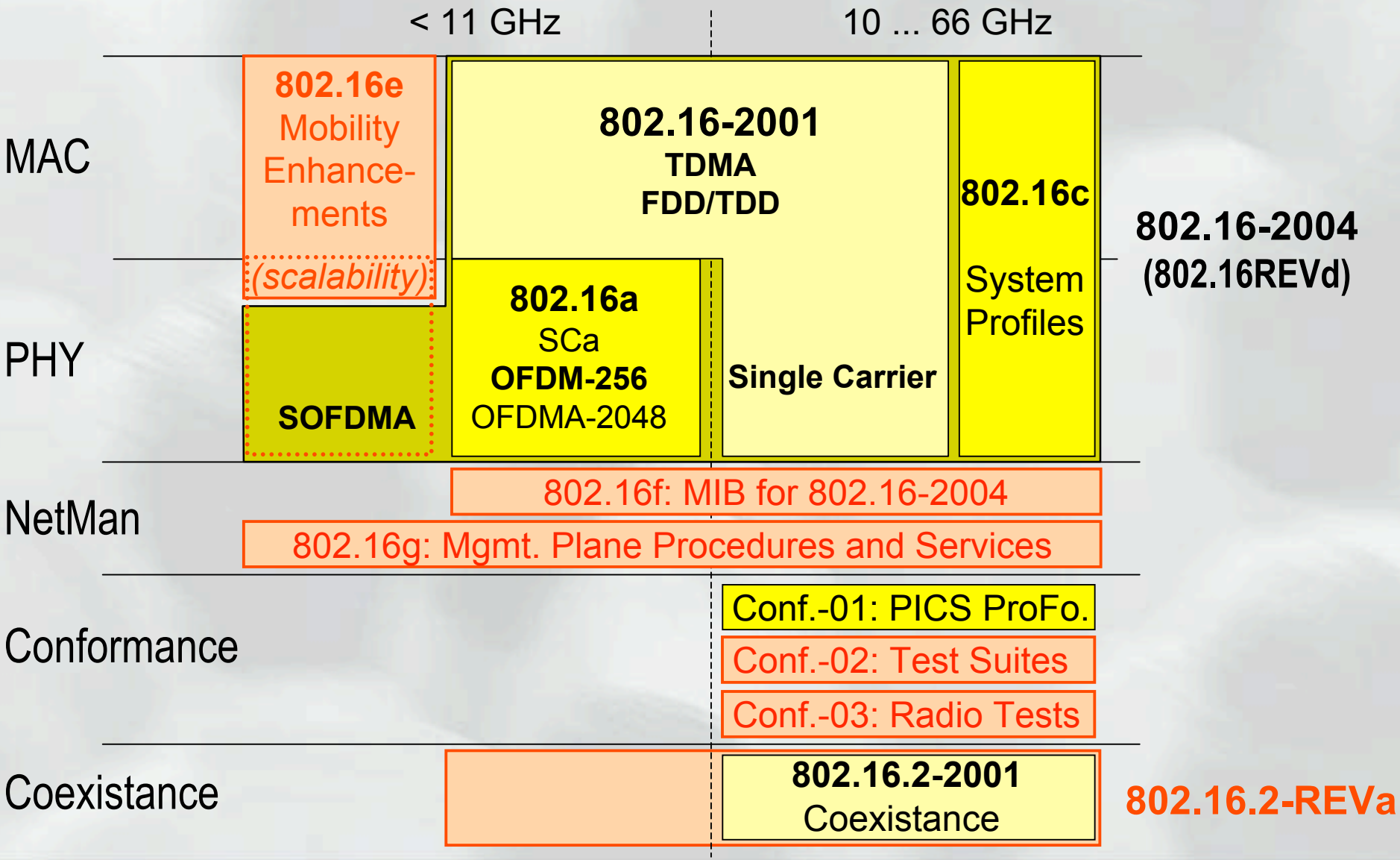

Worldwide Interoperability for Microwave Access

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- **The purpose of WiMAX is to promote deployment of broadband wireless access networks by using a global standard and certifying interoperability of products and technologies.**
  - Support IEEE 802.16 standard
  - Propose and promote access profiles for their IEEE 802.16 standard
  - Certify interoperability levels both in network and the cell
  - Achieve global acceptance
  - Promote use of broadband wireless access overall

  WiMAX should become for 802.16 what WiFi has become for 802.11
- **BoD: Intel (chair), Alvarion, Proxim, Fujitsu, Airspan, Aperto, WiLAN**
- **Current activities:**
  - Marketing
  - Development of system profiles and PICS proforma, Test Suite Structure and Test Purposes specifications and Abstract Test Suite specifications for the 256-point OFDM mode of 802.16-2004 (equiv. to ETSI HiperMAN)

WiMAX Evolution

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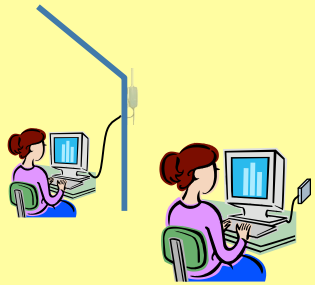
Fixed	Nomadic	Portable	Mobile
Wireless DSL	Hot Zone ***no handover (regulatory reasons)***	Hot Zone ***session continuity***	Mobility ***seamless handover***



WiMAX Profile#0

WiMAX Profile#1 (802.16-2004/802.16e)

WiMAX Profile#2 (802.16-2004/802.16e/802.16g)

WiMAX needs spectrum

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- **Current focus of WiMAX is on 'Fixed Wireless Access'**
  - based on IEEE802.16-2004 (initially OFDM-256, later SOFDMA)
  - aimed for following frequency bands
    3400 – 3600/3800 MHz (available in many countries, licensed)
    5725 – 5850 MHz (license exempt in US, licensed in other countries)
    2500 – 2690 MHz (MMDS, aimed for IMT-2000 extention in Europe)
- **WiMAX is pushing towards portable/mobile applications**
  - introducing SOFDMA & handover in IEEE802.16-2004/802.16e
  - providing mobility support to fulfill requirements of
    Sprint, Nextel and Korean's HPi (High-speed Portable internet)
  - initially aimed for the frequency bands
    2300 – 2400 MHz (Korea)
    2500 – 2690 MHz (Sprint, Nextel in US)
  - 'mobile' spectrum in Europe is tied to IMT-2000 technologies,
    may change in the framework of technology neutral assignments.
- ***WiMAX is blurring the differentiation between 'fixed' and 'mobile'.***

The network beyond the base station

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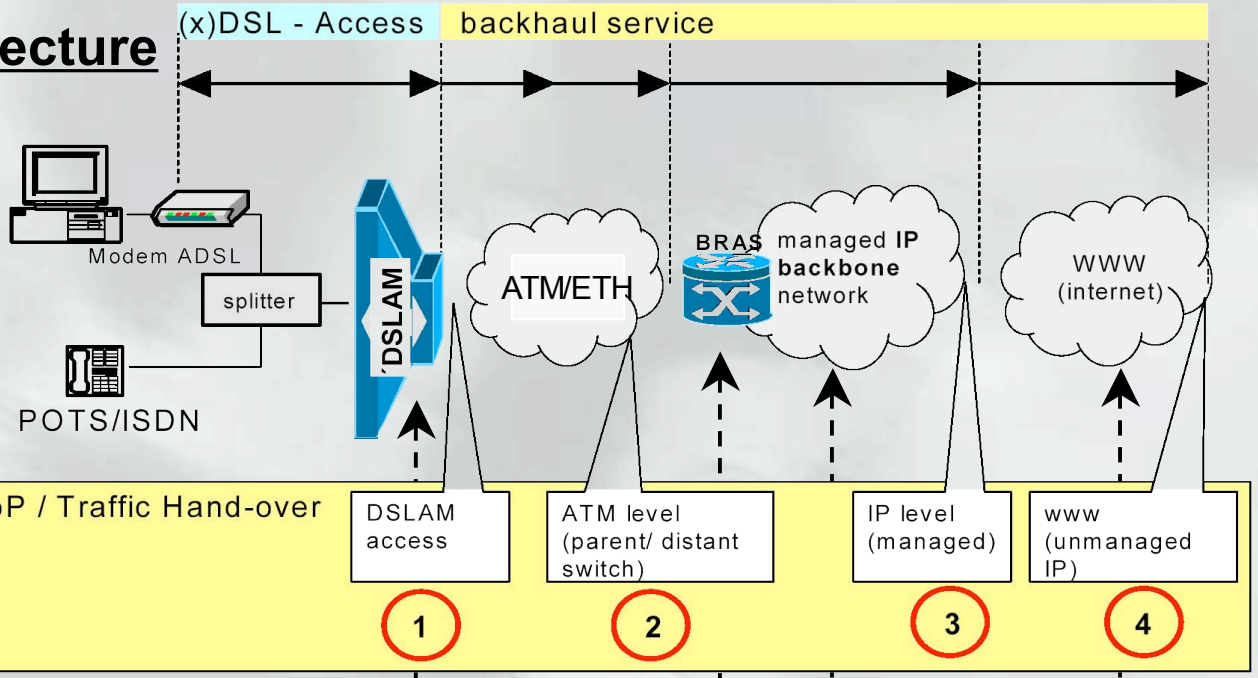
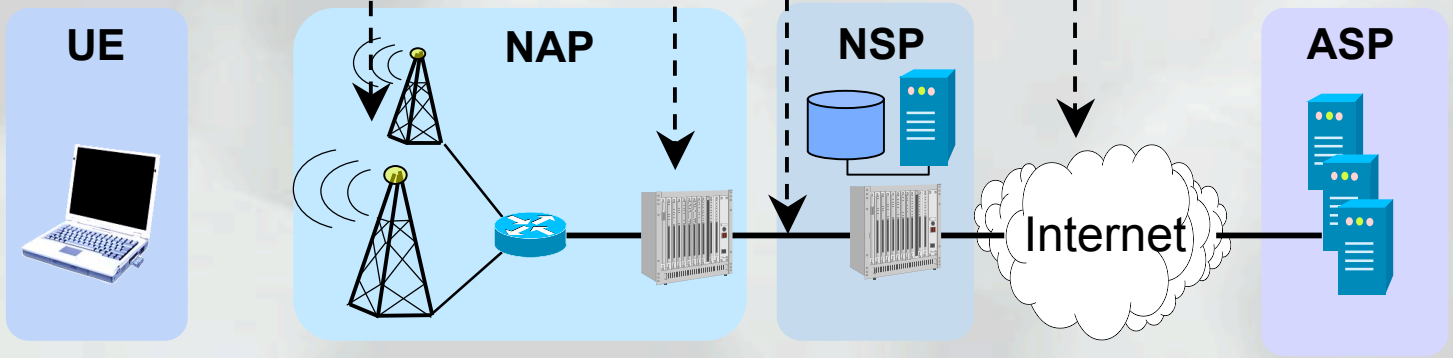
DSL Architecture



WiMAX Architecture



Wireless Mobility in IEEE802

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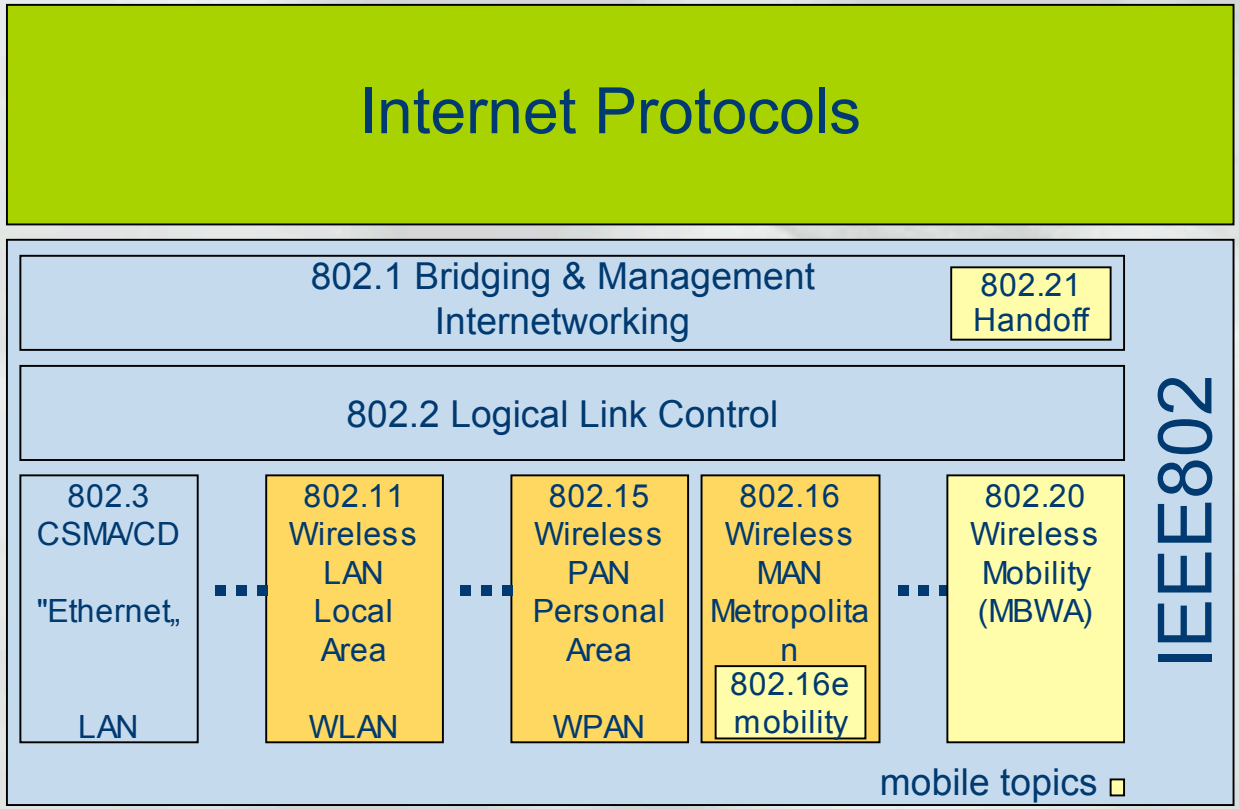

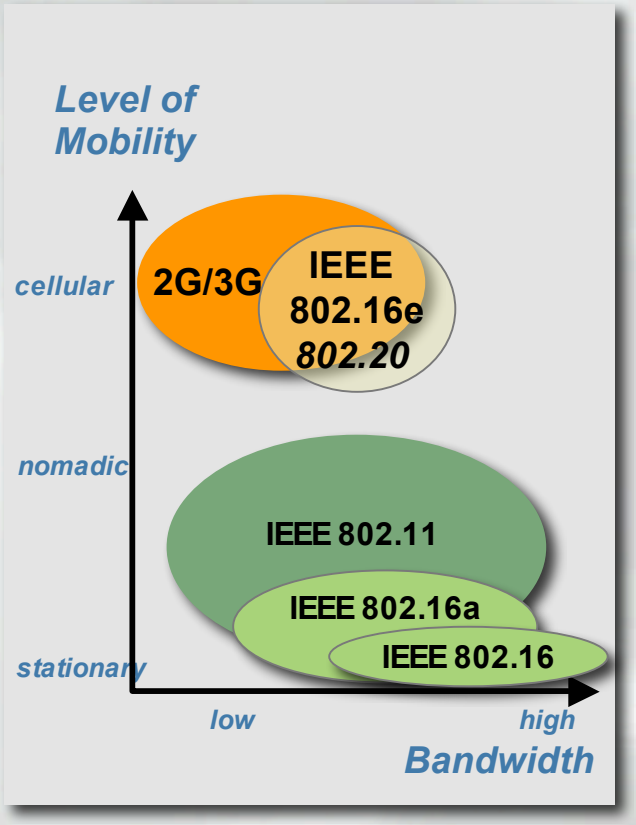

- **IEEE802 has set up two groups with nearly identical focus**
  - IEEE802.16e with backward compatibility to fixed and nomadic
  - IEEE802.20 from ground up new for enhanced mobility
- **IEEE802.20 is somewhat more challenging, but not ready before 2007**

The end

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- Thank you for your attention!
- Questions, comments?