

# Mengenai WiMAX

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# Acknowledgement

- Kantor Menteri Negara Riset & Teknologi
- PUSPIPTEK SERPONG
- Hariff
- TRG

# Outline

- Definisi
- Teknologi Broadband Wireless Access (BWA)
- Profil
- Fitur
- Produk
- Trend WiMAX
- Topology
- Implementasi
- WiMAX Advantage
- QOS Case Study

# DEFINISI

- WiMAX Forum IEEE 802.16
- Wi-Fi Alliance IEEE 802.11
- ZigBee Alliance IEEE 802.15

# WiMAX Forum

## **WiMAX Forum:**

an organization of more than 400 leading operators, communications component and equipment companies.

The WiMAX Forum's charter is to promote and certify the compatibility and interoperability of broadband wireless access equipment that conforms to the IEEE 802.16 and ETSI HiperMAN standards.

## **WiMAX (World-wide Interoperability Microwave Access):**

A standards-based technology enabling the delivery of last mile wireless broadband access as an alternative to wired broadband like cable and DSL.

# Standard Lainnya ..

## **IEEE 802.x**

IEEE Standard for Local and Metropolitan Area Networks

## **IEEE 802.16**

Air Interface for Fixed Broadband Wireless Access Systems for Metropolitan Area Networks

## **ETSI HiperMAN**

High Performance Radio Metropolitan Area Network standard created by the European High Performance Radio Metropolitan Area Network standard created by the European Telecommunication Standard Institute (ETSI) Broadband Radio Access Network (BRAN) group to provide wireless network communication in the 2-11 GHz across Europe.

# Standard Istilah ..

## **Broadband**

An internet connection with a much larger capacity than dial-up or ISDN (--wikipedia.org)

the term used to describe “higher bandwidth, always on services offering rates of 128kbps and above”. (--office of communication, UK)

## **Broadband Wireless Access (BWA)**

Broadband connection using wireless technology

# TEKNOLOGI BWA

- Microwave link
- LMDS (Local Multipoint Distribution Service)
- MMDS (Multichannel Multipoint Distribution Service)
- Wi-Fi (Wireless Fidelity)
- 3G
- WiMAX
- Satellite

# PHY Layer:

- 256 point FFT OFDM waveform
- Adaptive modulation & variable error correction encoding per RF burst
- TDD & FDD duplexing support
- Flexible channel size
- Designed to support smart antenna systems

# MAC Layer:

- TDM/TDMA scheduled Uplink/Downlink frames
- Scalable from 1 to hundreds subscribers
- Connection-oriented
- QoS: best effort, nRTPS, RTPS, UGS
- Adaptive modulation
- Encryption
- Automatic power control

# SPESIFIKASI BS 802.16d

- Std Compl IEEE 802.16-2004
- Physical Layer OFDM
- Frequency Band 2.3 GHz, 3.3 GHz
- Channel Size 3.5 MHz, 7 MHz
- FFT 256
- Duplex Mode TDD
- Modulation and Coding 64QAM, 16QAM, QPSK, BPSK
- Nomadic Support Yes
- Cyclic Prefix 1/4, 1/8, 11/16, 1/32
- Frame Duration 5 ms, 10 ms, 20 ms
- QOS UGS,RTPS,nRTPS,BE
- IPV4, VLAN,Bridging,routing

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- IPV4, Bridging

# SPEKIFIKASI ACCESS MANAGER

- Std Compl IEEE 802.16f MIB
- Static routing
- Dynamic routing ospf,rip
- Manage Base station
- SNMP Base
- Monitoring and Collecting BS
- Support AAA Radius
- Support Nomadic AAA for BS

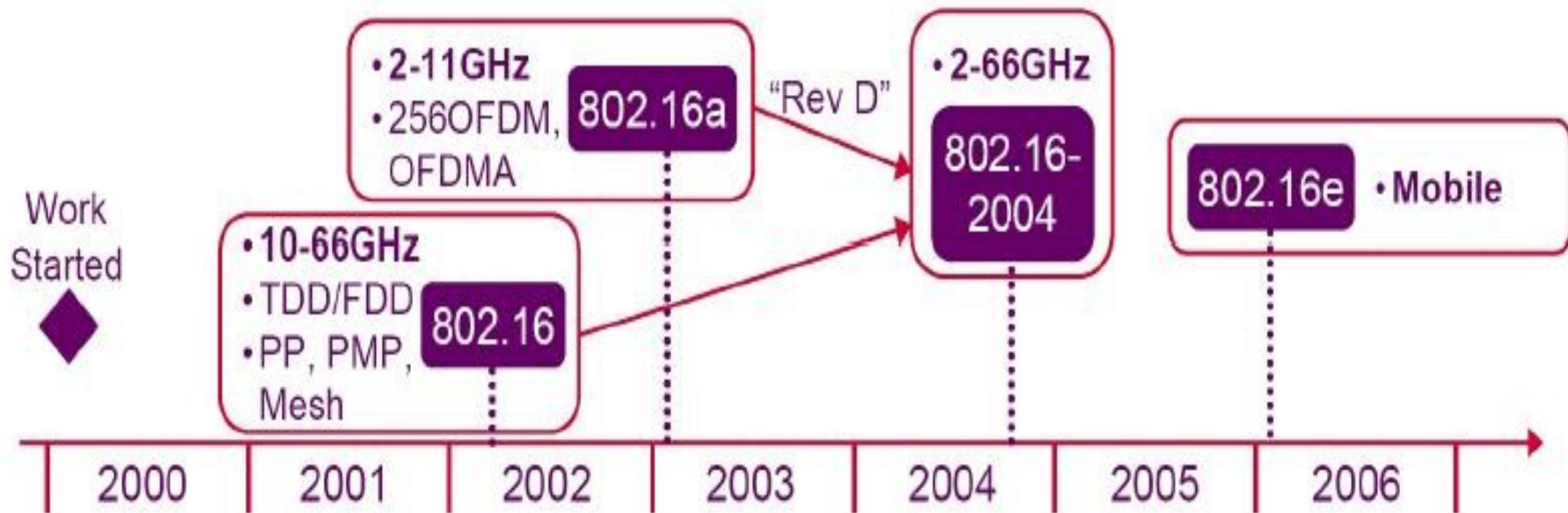
# SPEKIFIKASI NETWORK MANAJEMEN SERVER

- Web based GUI
- IEEE 802.16f standard MIB
- Radius Server AAA
- Database SQL
- NBI CORBA (future)
- User registration and service class provisioning
- User activity monitoring and statistic
- System alarm
- Time and Volume Accounting

# Frekuensi, Kapasitas & Jarak

Teknologi	Frekuensi	Share?	Kapasitas	Jarak
Microwave	2,4,6, 21.3-23.6GHz > 40GHz UHF (berlisensi)	ya	s/d 155MBps per link	5 km
LMDS	13-26 GHz (berlisensi)	ya	s/d 155Mbps per base station	4 km
MMDS	2.5-2.6GHz (berlisensi)	ya	s/d 10 Mbps per base station	50 km
WiFi	2.4GHz, 5.8GHz (tidak berlisensi)	ya	11Mbps, 54Mbps, 104Mbps.	100 meter
3G	1.92-1.98GHz 2.11-2.17GHz (berlisensi)	ya	s/d 2 Mbps per mobile subscriber	Coverage host network
WiMAX Standard	3.5GHz (berlisensi)	ya	2.8-11.3 Mbps per downlink per CPE 2.8-11.3 Mbps per uplink per CPE	LOS 10-16 km NLOS 1-2 km Indoor NLOS 0.3-0.5 km
WiMAX Full feature	3.5GHz (berlisensi)	ya	2.8-11.3 Mbps per downlink per CPE 0.17-0.7 Mbps per uplink per CPE (di tepian sel sektoral)	LOS 30-50 km NLOS 3-8 km Indoor NLOS 1-2 km

# Evolusi Standard 802.16



# Evolusi Standard 802.16

	<b>802.16</b>	<b>802.16a</b>	<b>802.16e</b>
Modulasi	QPSK 16 QAM 64 QAM	OFDM 256 QPSK 16 QAM 64 QAM	QPSK 16 QAM 64 QAM
Bit Rate	32 – 134 Mbps pada 28 MHz channelization	< 75 Mbps pada 20 MHz channelization	< 15 Mbps pada 5 MHz channelization
Chanel Bandwidth	20, 25 atau 28 MHz	Dapat di pilih dari 1.25 s/d 20 MHz	20, 25 atau 28 MHz

# Konvergensi Teknologi Wireless

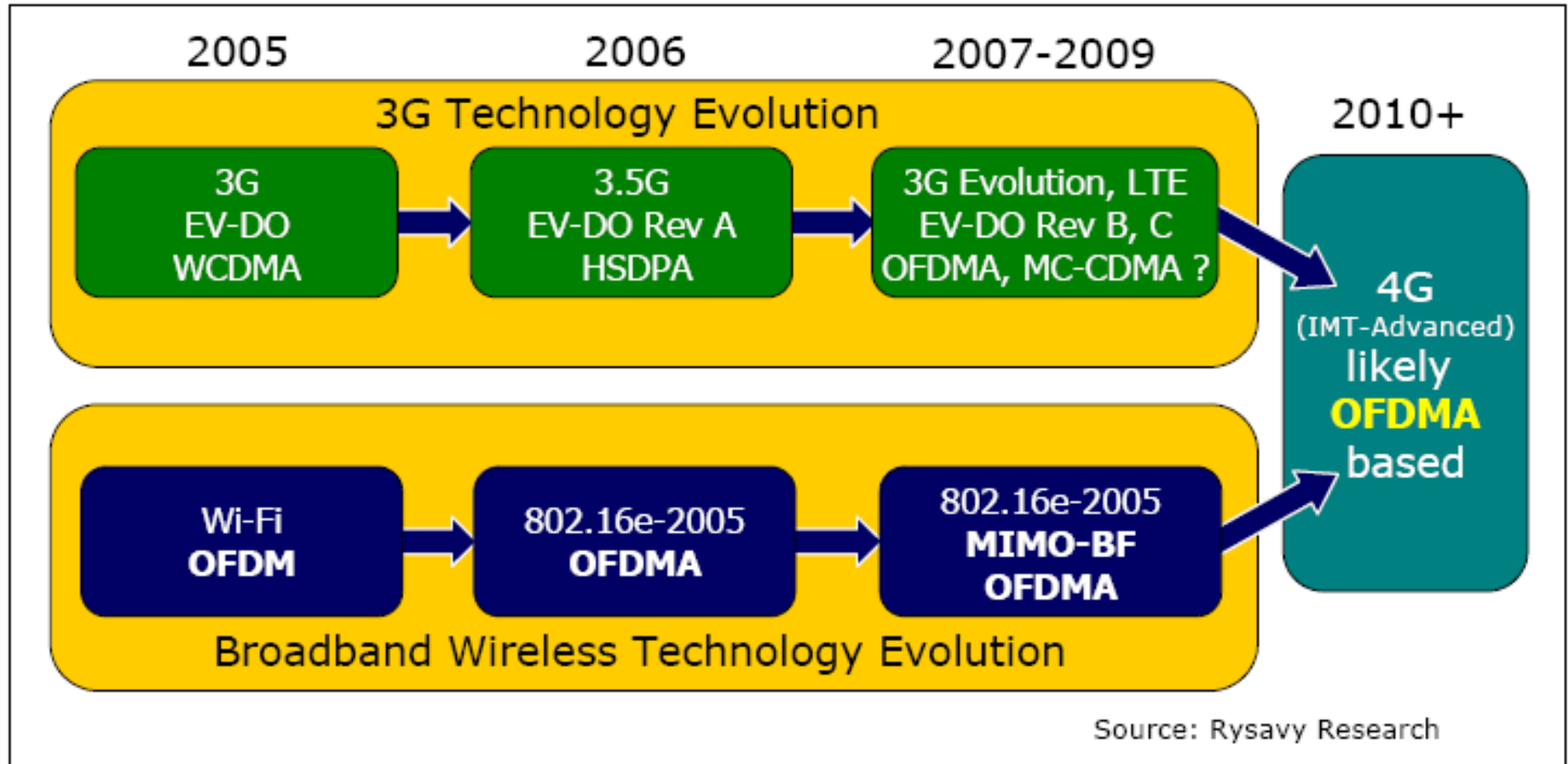


Figure 3: Mobile Technologies are Converging

# Personal Broadband

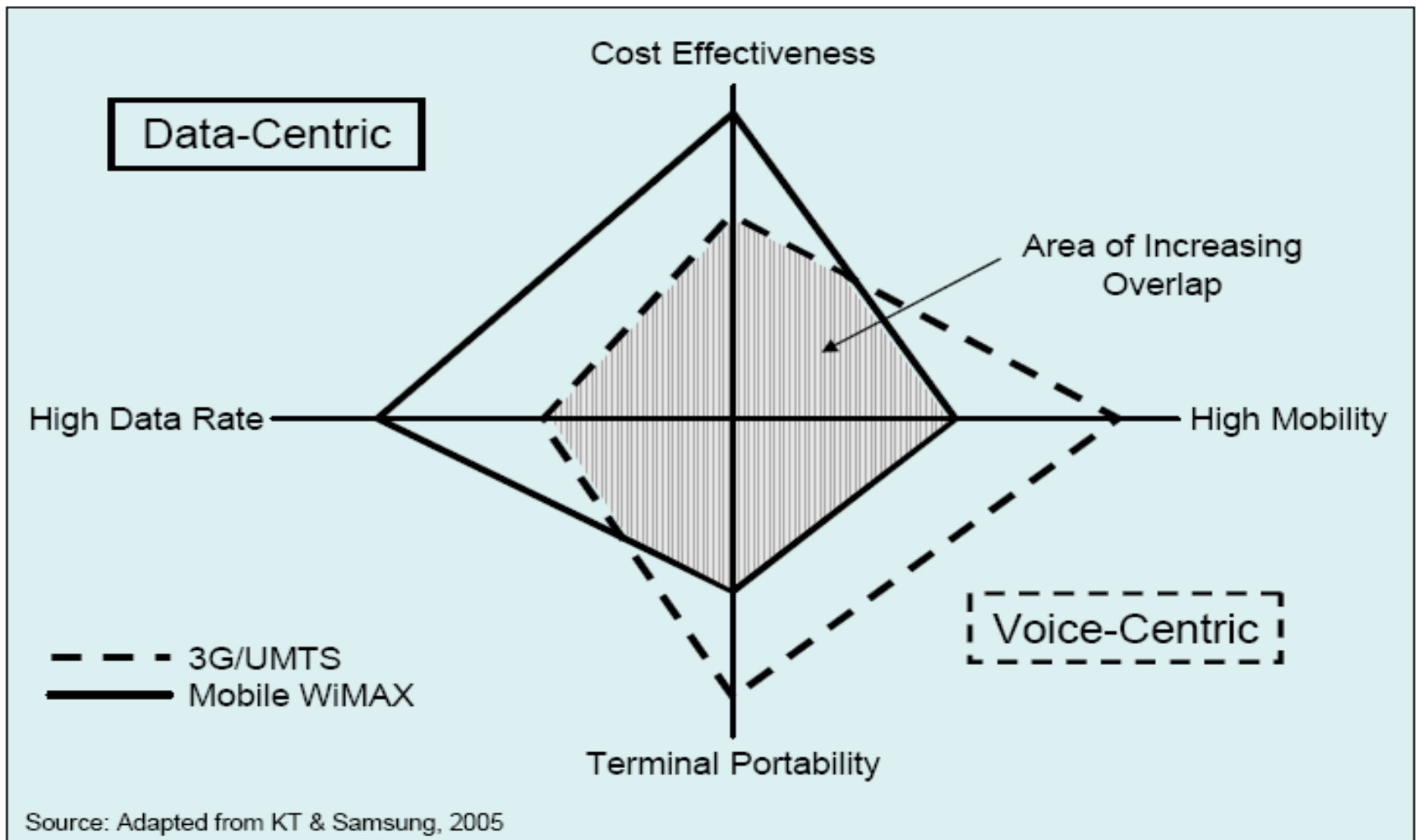


Figure 2: Varied Approaches to Personal Broadband

# Kelebihan & Kekurangan

Teknologi	Kelebihan	Kekurangan
Microwav	Instalasi yang cepat	LOS Point to Point saja
LMDS	Point-to-MultiPoint Kapasitas sangat besar	LOS Tidak terstandarisasi
MMDS	Point-to-MultiPoint NLOS jarak Jauh	Kapasitas Kecil Tidak terstandarisasi
WiFi	Ethernet compliant Terstandarisasi 802.11a/b/g/n	Hanya untuk LAN Masalah di keamanan jaringan
3G	Mobile terminal menggunakan infrastruktur jaringan selular	Spektrum frekuensi yang mahal membatasi aplikasi
WiMAX Standard	NLOS sedang di standarisasi (kecuali jika menggunakan versi pertama 802.16)	Sangat mudah mencapai 2 Mbps per subscriber. Ukuran sel NLOS 1-2 km.
WiMAX Full feature	NLOS sedang di standarisasi (kecuali jika menggunakan versi pertama 802.16)	Sangat mudah mencapai 2 Mbps per subscriber. Ukuran sel NLOS 1-2 km menggunakan peralatan Indoor yang di install sendiri oleh pelanggan.