

휴대 인터넷

2.3GHz Portable Internet

- WiBro -



November, 5, 2004

Changhoi Koo
(chkoo@samsung.com)

Samsung Electronics. Co.



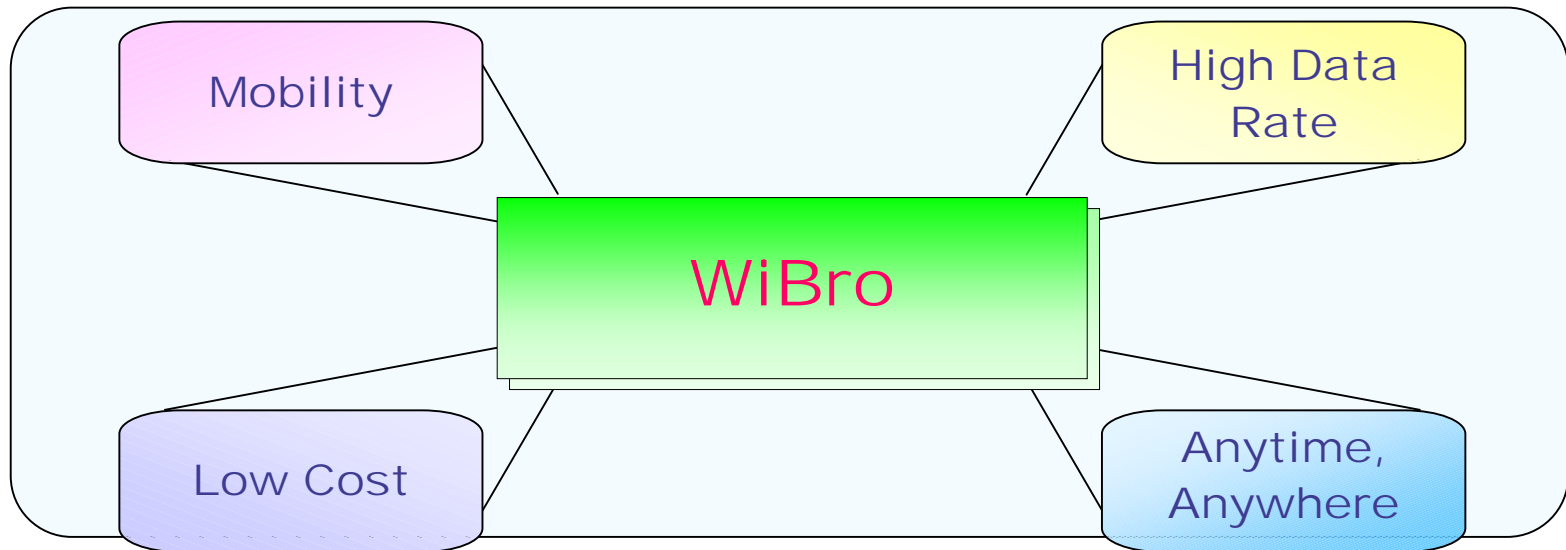
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Introduction to WiBro Systems

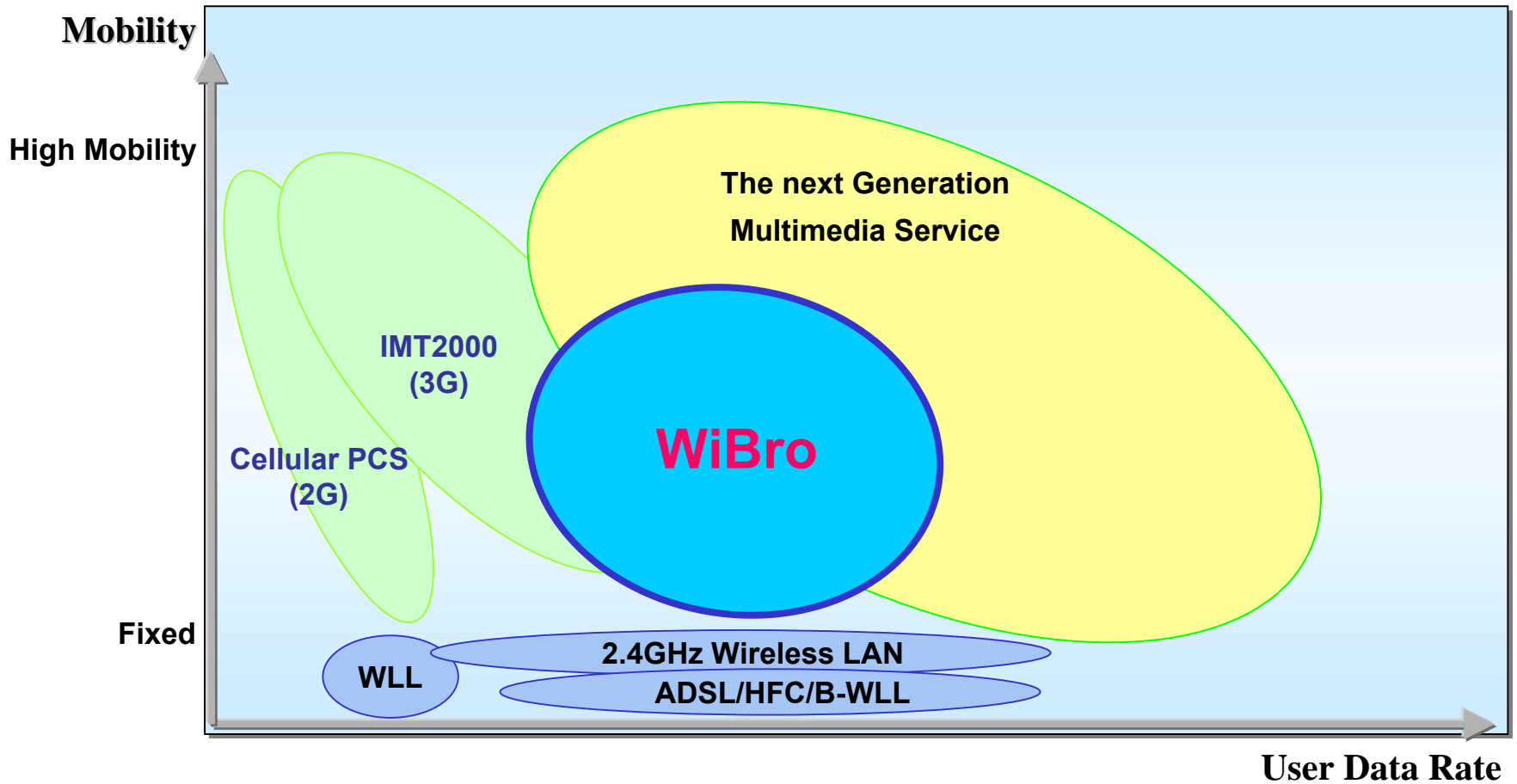
Definition

- **Wireless Broadband : WiBro**
- **3.5G(Generation) Wireless Mobile Communication System**
- **High-speed Portable Internet**
- **Based on TTA PG302 and IEEE802.16d/e**



Positioning

● WiBro in aperture between 3G and 4G



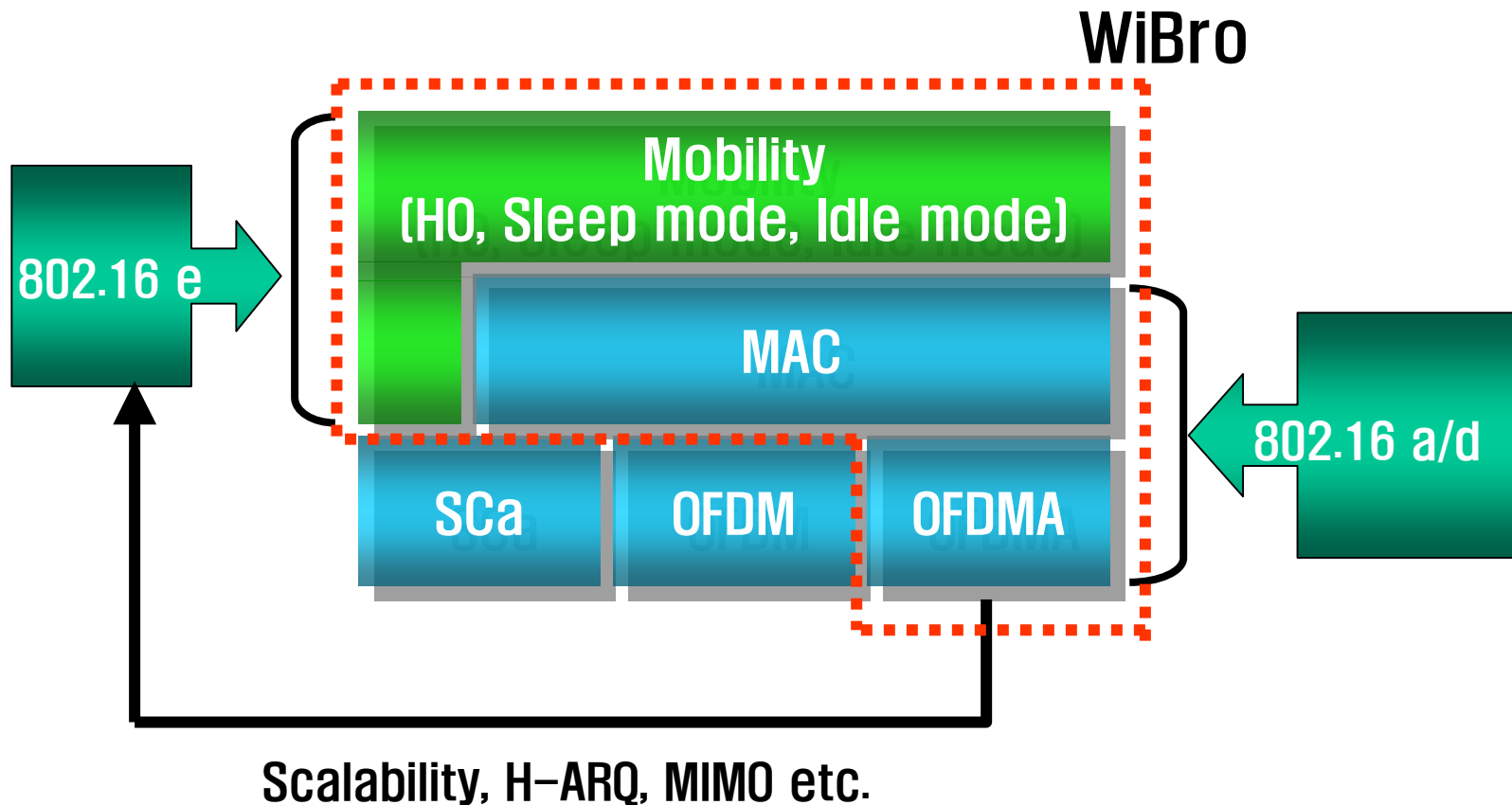
System Specification

- TDMA -> CDMA -> OFDM(A) ?
- Toward 4G Mobile Communication Systems

Major System Parameters		Radio Access Requirement	
Duplexing	TDD	Frequency Reuse Factor	1
Multiple Access	OFDMA	Mobility	≤ 60 [Km/h]
Channel BW	8.75 [MHz]	Service Coverage	≤ 1 [Km]
		Spectral Efficiency [bps/Hz/cell(sector)]	Max. DL / UL = 6 / 2 Aver. DL / UL = 2 / 1
		Handoff	≤ 150 [ms]
		Throughput (per user)	Max. DL / UL = 3 / 1 [Mbps] Min. DL / UL = 512 / 128 [Kbps]

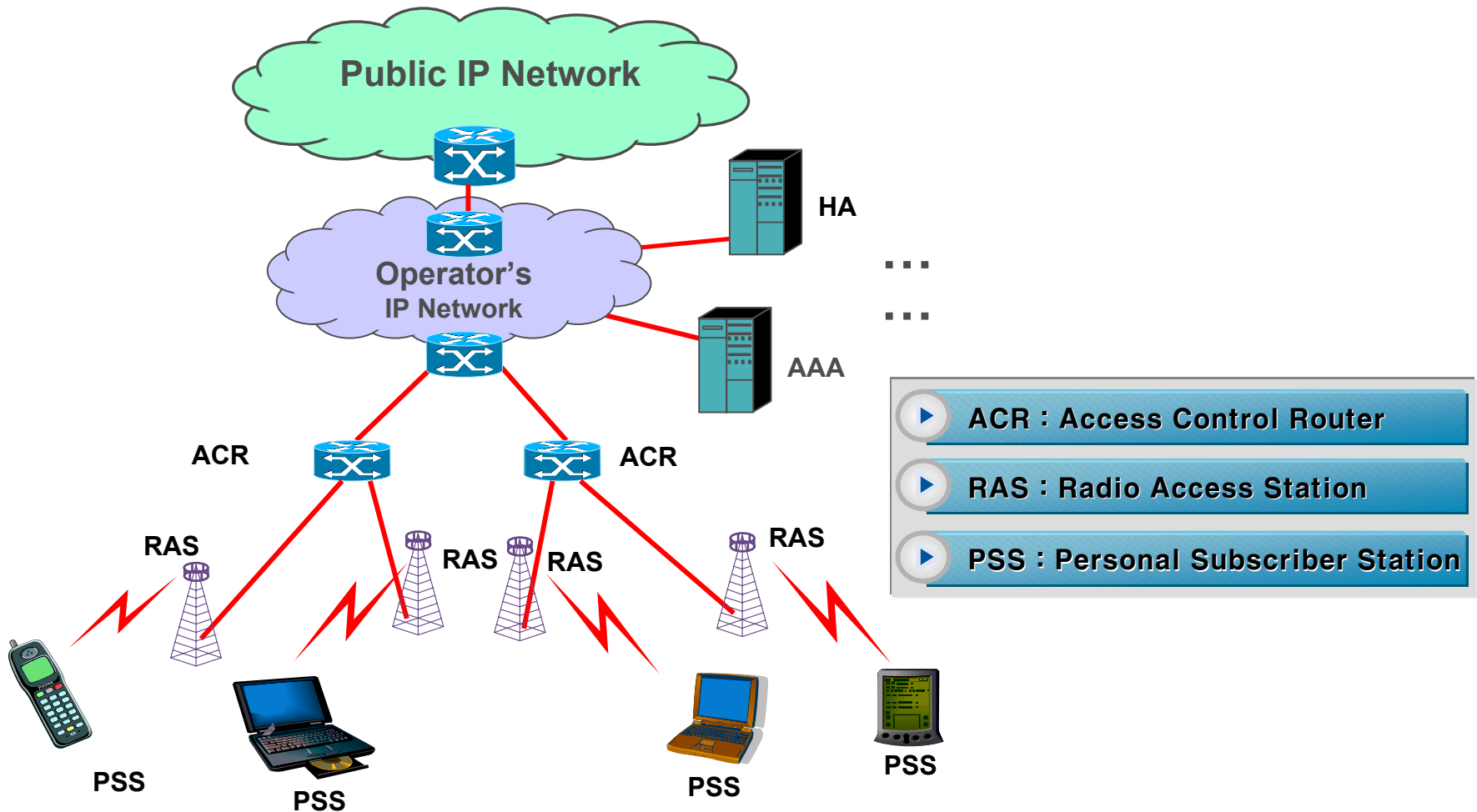
Protocol Stack

- Physical Layer and MAC layer
- Upper layer functionalities for Mobility
 - Core network interface



Network Reference Model

- Access Network (PSS-RAS)
- Core Network(RAS-ACR, ACR-ACR)





Implementation of WiBro Systems

Key Requirements

Requirements	Current Design Directions
Flexible Network Architecture for multiple market segments (Scalability in Cost, Coverage and Capacity)	<ul style="list-style-type: none">● Public Macro-cell – Mobility & Coverage driven● Public Hot-zone – Throughput & Service driven● Private (Home/Enterprise) – Cost, Easy to deploy
Service Compatibility between networks and devices	<ul style="list-style-type: none">● Common User Authentication and security● Capability and Preference Negotiation in L2 level
Better Service Quality	<ul style="list-style-type: none">● Voice Service<ul style="list-style-type: none">- Seamless Active Handoff (break time < 40msec)- Idle mode/paging, FCS support● Data Service<ul style="list-style-type: none">- High throughput & QoS support- Stable operation at saturation point and CAC- Seamless Active L2 HO (packet lossless)
3G Inter-working	<ul style="list-style-type: none">● 3G Circuit Service Availability while connected to WiBro● Flexible network configuration but efficient 3G signaling

Network Elements (1/2)

- Session Information Store
- Location Tracking & Paging
- Session Migration
- Interface with IP Core

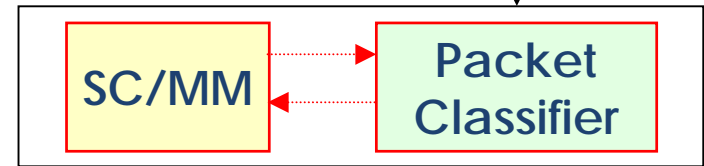
ACR

- MAC Signaling
- Transport Connection Control
- L2 Handoff Control

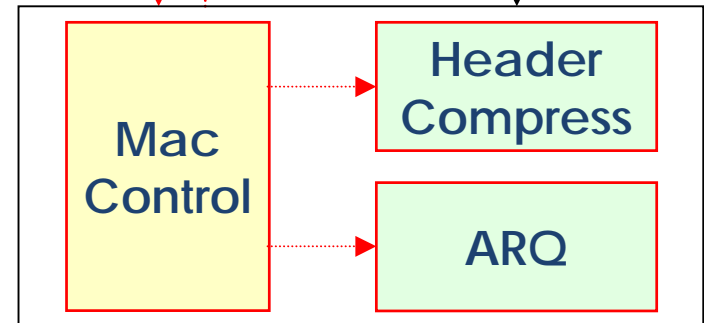
RAS

- MAC scheduler
- Modem Control

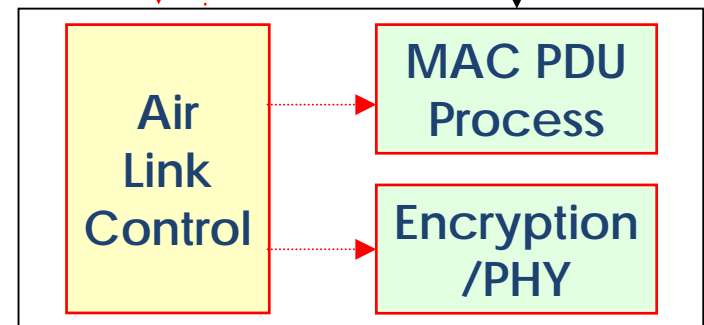
ASN (Access Serving Node)



APC (AP Controller)



AP (Access Point)



tunnel

tunnel

Network Elements (2/2)

- APP(Air Physical Processing)

- 802.16 d/e PHY
- Delay sensitive MAC (including scheduling)

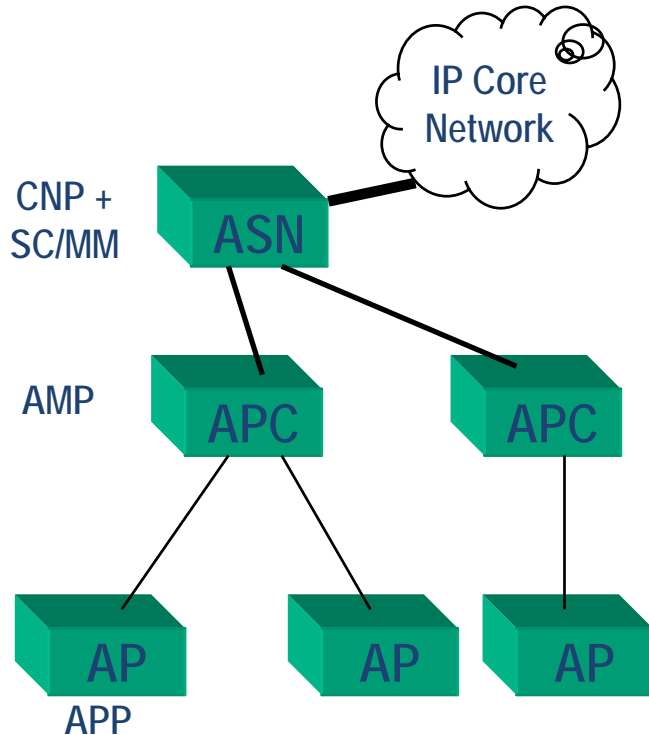
- AMP(Air MAC Processing)

- 802.16 d/e delay insensitive MAC (e.g., header suppression, key management, ARQ)
- L2 Handoff Control

- CNP(Core Network Processing)

- Inter-working with core networks (e.g., DHCP, HA, AAA)
- Session information handling & location tracking (i.e., SC/MM : Session Control and Mobility Management)

Network Configuration (1/4)



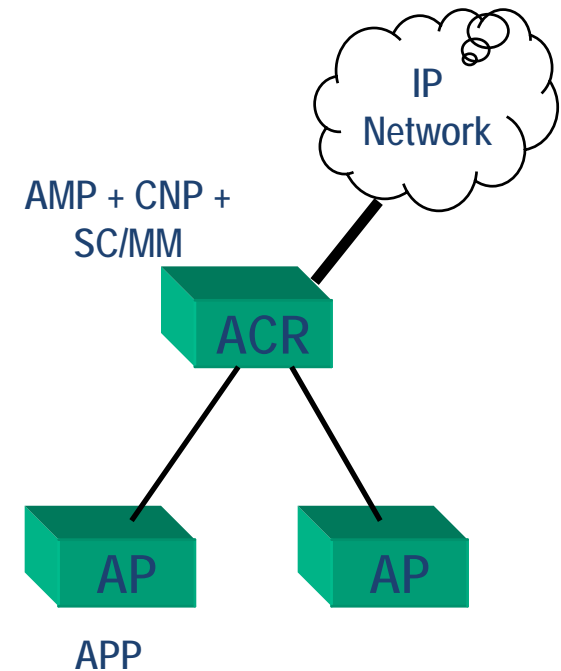
Type I

	Type I
Network Elements	● ASN, APC, AP
Configuration	● 1 ~ 3 APC/ASN ● 320 AP/APC ● 320 ~ 960 AP/ASN
Pros.	● Seamless handover ● Large subnet coverage
Cons.	● 3-tier architecture ● High-speed backhaul required
Target Market	● Centralized-Mobile ● Public (Macro-cell)

Network Configuration (2/4)

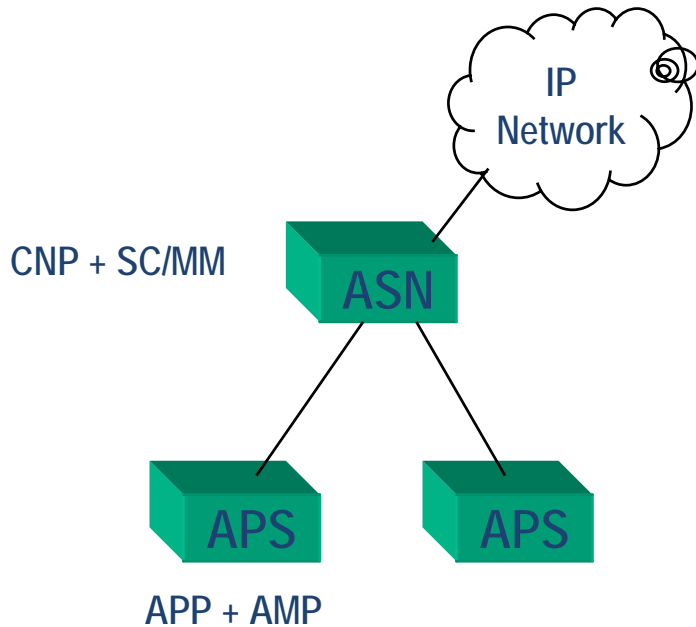


	Type II
Network Elements	● ACR, AP
Configuration	● 160~240 AP/ACR
Pros.	● Seamless handover
Cons.	● High-speed backhaul required
Target Market	● Centralized-Mobile ● Public(Micro/Hot Zone)



Type II

Network Configuration (3/4)

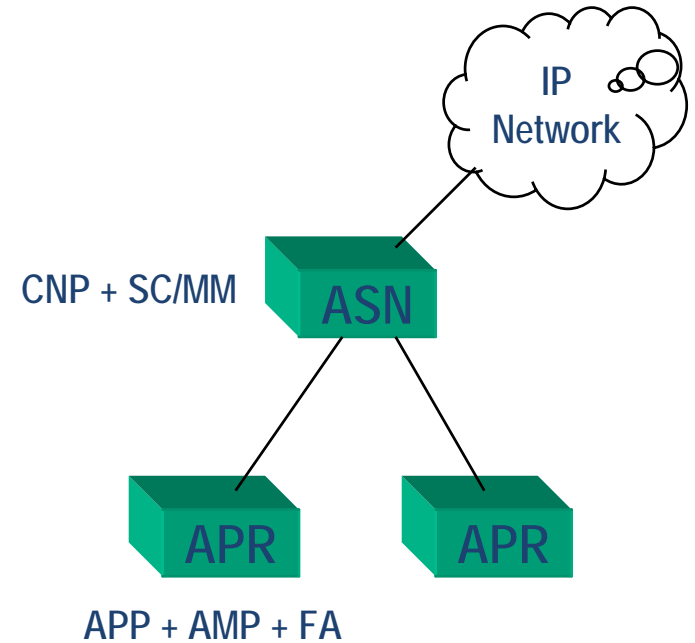


Type III

	Type III
Network Elements	● ASN, APS
Configuration	● 320 ~ 960 APS/ASN
Pros.	● Simple architecture
Cons.	● Non-seamless handover
Target Market	● Distributed-Portable ● Enterprise/Home

Network Configuration (4/4)

	Type IV
Network Elements	● ASN, APR
Configuration	● 320 ~ 960 APR/ASN
Pros.	<ul style="list-style-type: none"> ● Simple architecture ● Local routing capability
Cons.	● Non-seamless handover
Target Market	<ul style="list-style-type: none"> ● Distributed-Portable ● Enterprise/Home

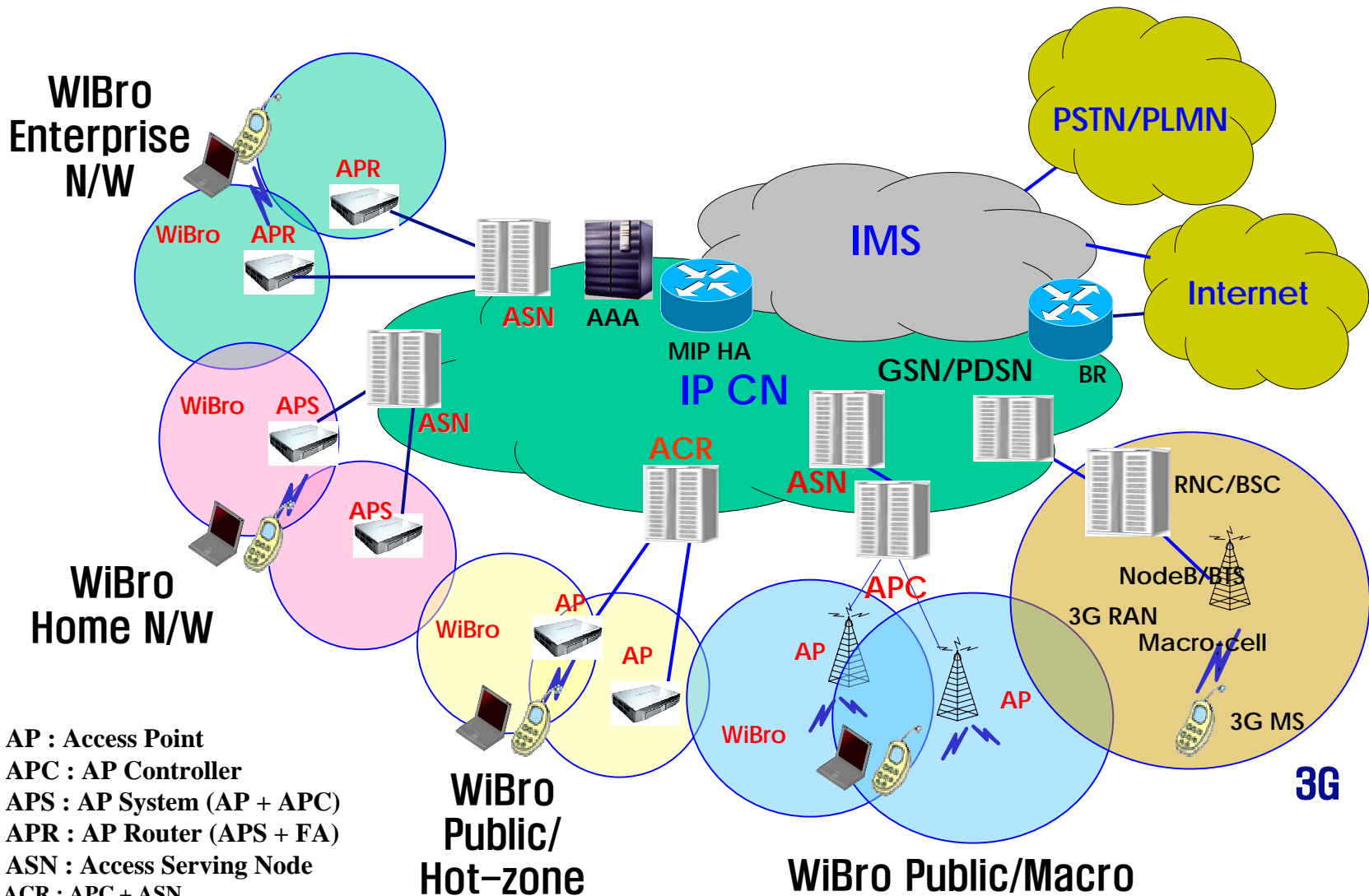


Type IV

Network Configuration Comparison

	Type I	Type II	Type III	Type IV
Network Elements	<ul style="list-style-type: none"> ● ASN, APC, AP 	<ul style="list-style-type: none"> ● ACR, AP 	<ul style="list-style-type: none"> ● ASN, APS 	<ul style="list-style-type: none"> ● ASN, APR
Config.	<ul style="list-style-type: none"> ● 1~3 APC/ASN ● 320 AP/APC ● 320~960 AP/ASN 	<ul style="list-style-type: none"> ● 160~240 AP/ACR 	<ul style="list-style-type: none"> ● 320 ~ 960 APS/ASN 	<ul style="list-style-type: none"> ● 320 ~ 960 APR/ASN
Pros.	<ul style="list-style-type: none"> ● Seamless HO ● Large subnet coverage 	<ul style="list-style-type: none"> ● Seamless HO 	<ul style="list-style-type: none"> ● Simple architecture 	<ul style="list-style-type: none"> ● Simple architecture ● Local routing capability
Cons.	<ul style="list-style-type: none"> ● 3-tier architecture ● High-speed backhaul required 	<ul style="list-style-type: none"> ● High-speed backhaul required 	<ul style="list-style-type: none"> ● Non-seamless HO 	<ul style="list-style-type: none"> ● Non-seamless HO
Target Market	<ul style="list-style-type: none"> ● Centralized-Mobile ● Public (Macro-cell) 	<ul style="list-style-type: none"> ● Centralized-Mobile ● Public(Micro/Hot Zone) 	<ul style="list-style-type: none"> ● Distributed-Portable ● Enterprise/Home 	<ul style="list-style-type: none"> ● Distributed-Portable ● Enterprise/Home

WiBro Network Architecture



- AP : Access Point
- APC : AP Controller
- APS : AP System (AP + APC)
- APR : AP Router (APS + FA)
- ASN : Access Serving Node
- ACR : APC + ASN



A Tend of Standardization

● TTA PG302

■ Service Network Working Group

- RAS-ACR Interface
- ACR-ACR Interface
- Work Items and specific work scope discussion

● IEEE802.16

■ Task Group f/g

- Network Management
- Base Station-Base Station Interface
- Backbone communication protocol (BS-BS)
- IEEE802.16f/g-draft under reviewing