

# ITU-R Studies on Broadband Wireless Access

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This presentation focuses on;

- ? What is “ Wireless Access ” ?
- ? ITU-R standardization activity on BWA
- ? Recent topics including liaison with SDOs (\*)

(\*) Standardization Development Organization

## ITU-R Recommendation F.1399

(Vocabulary of terms for wireless access)

### FWA: Fixed Wireless Access

*wireless access* application in which the location of the *end-user termination* and the network access point to be connected to the end-user are fixed.

### MWA: Mobile Wireless Access

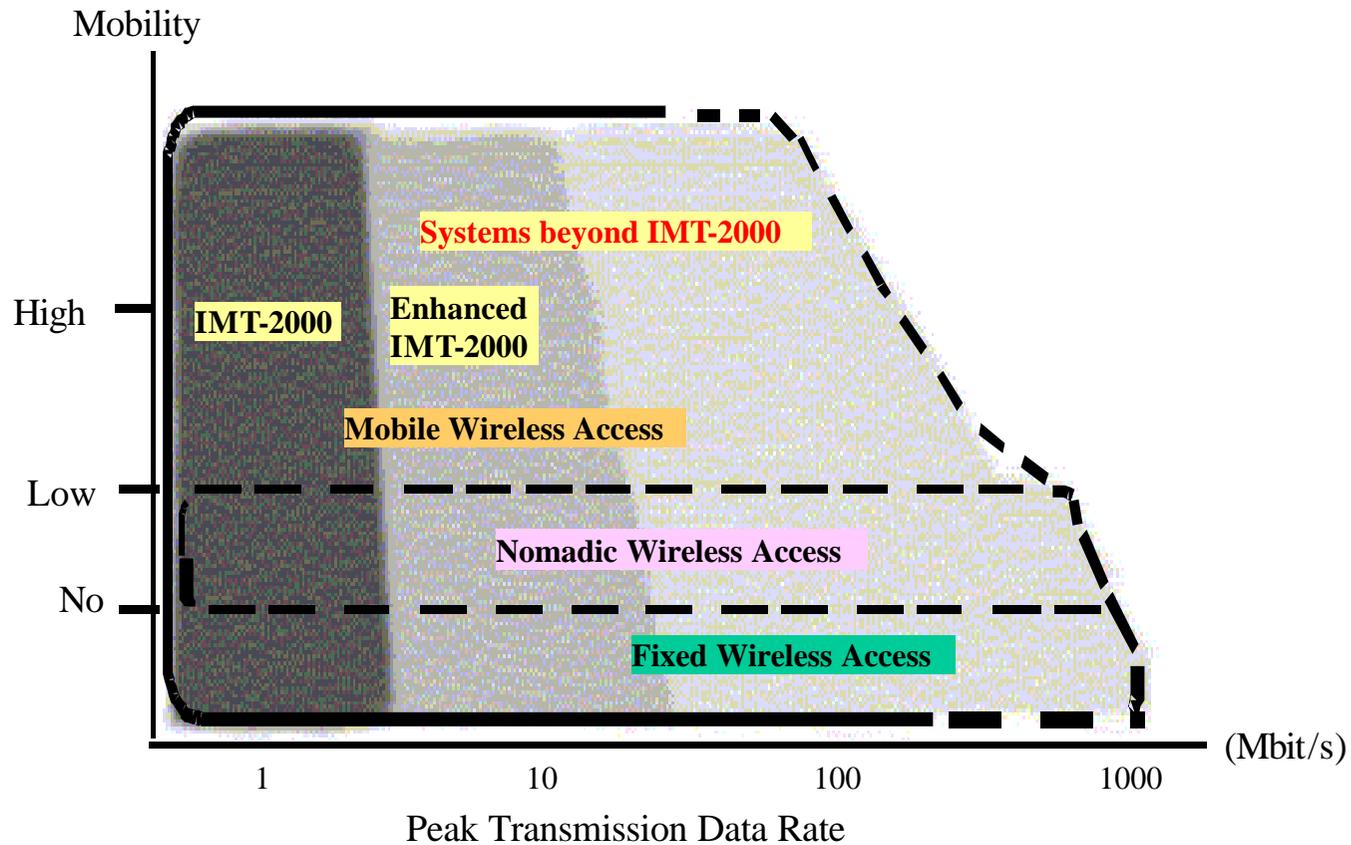
*wireless access* application in which the location of the *end-user termination* is mobile.

### NWA: Nomadic Wireless Access

*wireless access* application in which the location of the *end-user termination* may be in different places but it must be stationary while in use.

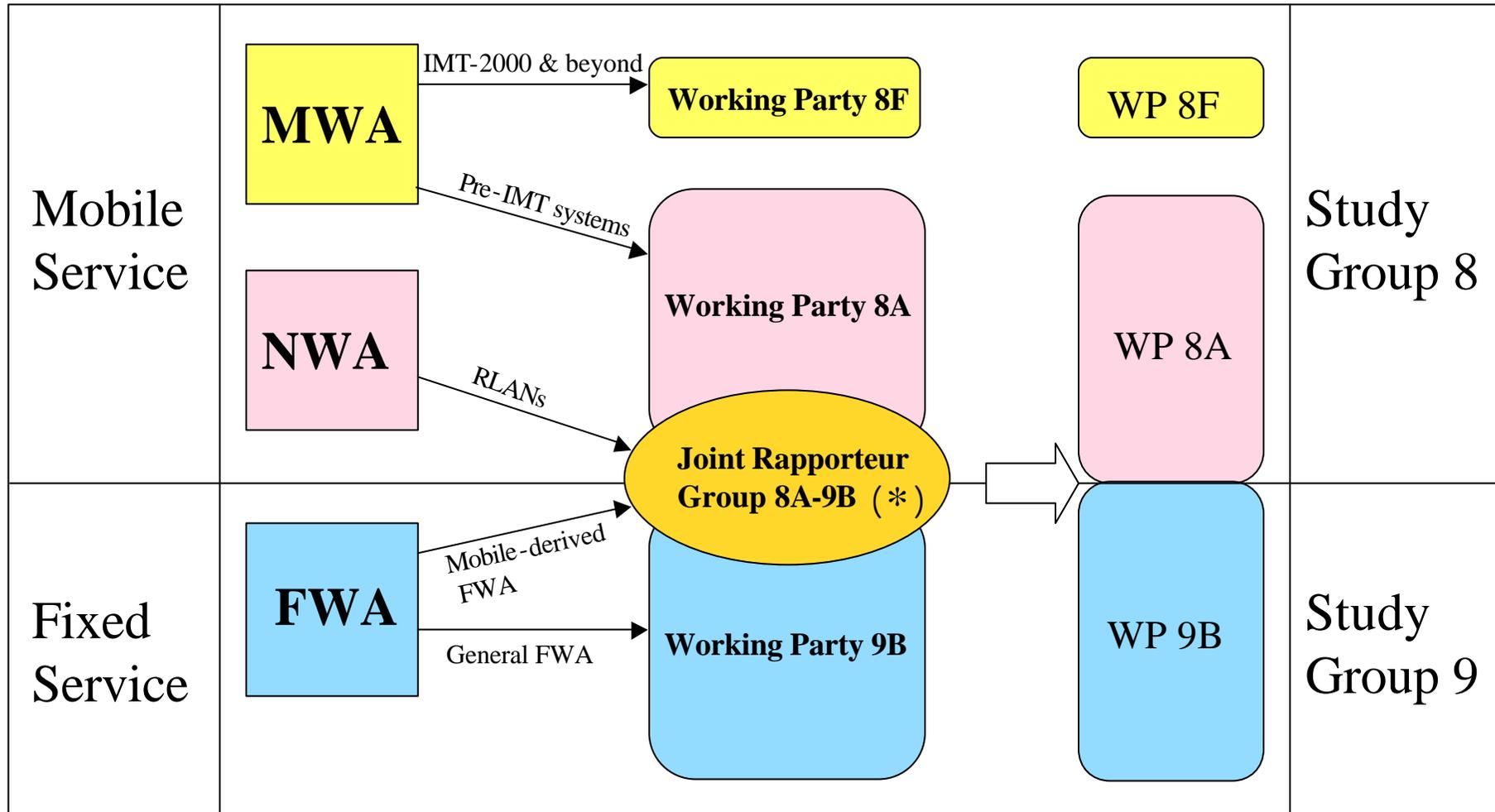
# Mapping of Wireless Access

Mobility and Bit rate of 3 types of Wireless Access



(The Figure is based on Recommendation ITU-R M.1645.)

# Studies on Wireless Access in ITU-R



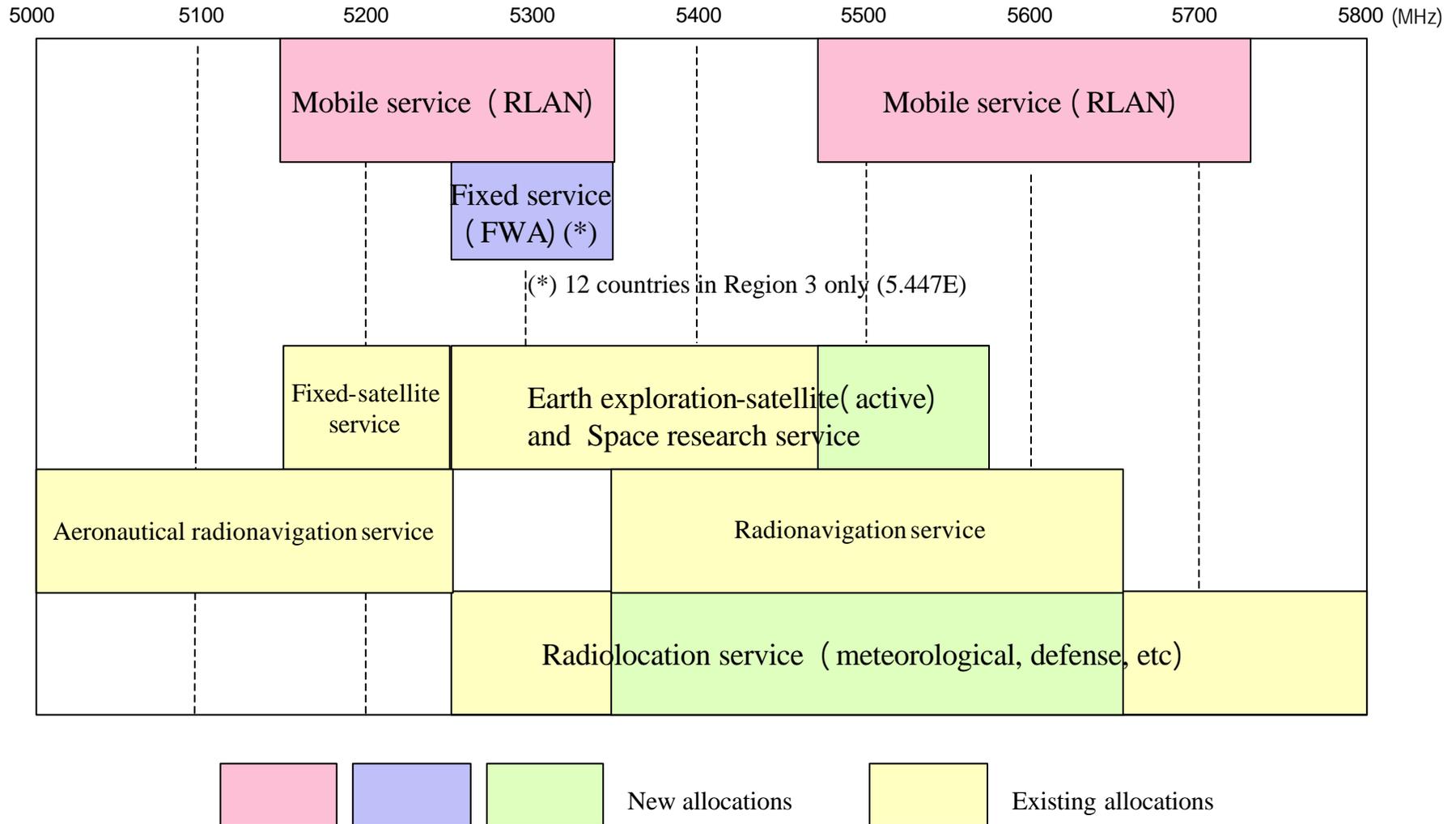
(\*) JRG 8A-9B was disbanded in November 2003 .

	<b>Rec. ITU-R</b>	<b>Short title</b>
Terminology	F.1399	Vocabulary of terms for wireless access
Performance & Availability	F. 757	Basic system requirements and performance objectives for FWA using mobile-derived technologies
	F.1400	Performance and availability objectives for FWA to PSTN
Characteristics	F.1490	Generic requirements for fixed wireless access (FWA) systems
	F.1499	Radio transmission systems for fixed BWA based on cable modem standards
Radio frequency arrangement	F.1401	Considerations for the identification of possible frequency bands for fixed wireless access and related sharing studies
	F.1488	Frequency block arrangements for FWA systems in the range 3 400-3 800 MHz
	F.1496	Radio-frequency channel arrangements for fixed wireless systems operating in the band 51.4-52.6 GHz
	F.1497	Radio-frequency channel arrangements for fixed wireless systems operating in the band 55.78-59 GHz
	F.1519	Guidance on frequency arrangements based on frequency blocks for systems in the fixed service
	F.1567	RF channel arrangement for digital fixed wireless systems operating in the frequency band 406.1 to 450 MHz
	F.1568	RF block arrangements for FWA systems in the range 10.15-10.3/10.5-10.65 GHz
Sharing & Compatibility	F.1402	Frequency sharing criteria between a land MWA system and a FWA system using the same equipment type as the MWA system
	F.1489	A methodology for assessing the level of operational compatibility between FWA and radar systems when sharing the band 3.4-3.7 GHz
	F.1613	Operational and deployment requirements for FWA systems in Region 3 to ensure the protection of systems in the EESS (active) and the SRS (active) in the band 5 250-5 350 MHz
Others	F.1671	Guidelines for a process to address the deployment of area-licensed fixed wireless systems operating in neighbouring countries

Note: Application of some Recommendations include short range back-haul systems

FWA application	Preferred frequency bands		Other access media	Factors to be considered
<b>Urban area FWA</b> (Last-1000 m connection)	<b>Upper SHF</b>	10.5 GHz	F.1568	Optical fibre · High-density deployment · Sharing with space services
		18 GHz	F. 595	
		26-28 GHz	F. 748	
		38 GHz	F.749	
<b>Residential area FWA</b> (Last-100m connection)	<b>Lower SHF</b>	2.4 GHz	-	· Optical fibre · DSL · Wireless LAN · Compatibility with ISM application · Line-of-sight condition · License-exempt use of nomadic wireless access systems for FWA
		3.4 GHz	F.1488	
		5.3 GHz	-	
		5.5-5.7GHz	-	
<b>Rural area FWA</b>	<b>UHF</b>	450 MHz	F.1567	Cellular phone · Line-of-sight condition · Sharing/compatibility with other radio services
		Below 1 GHz	-	

# New 5 GHz frequency allocations approved at WRC-03



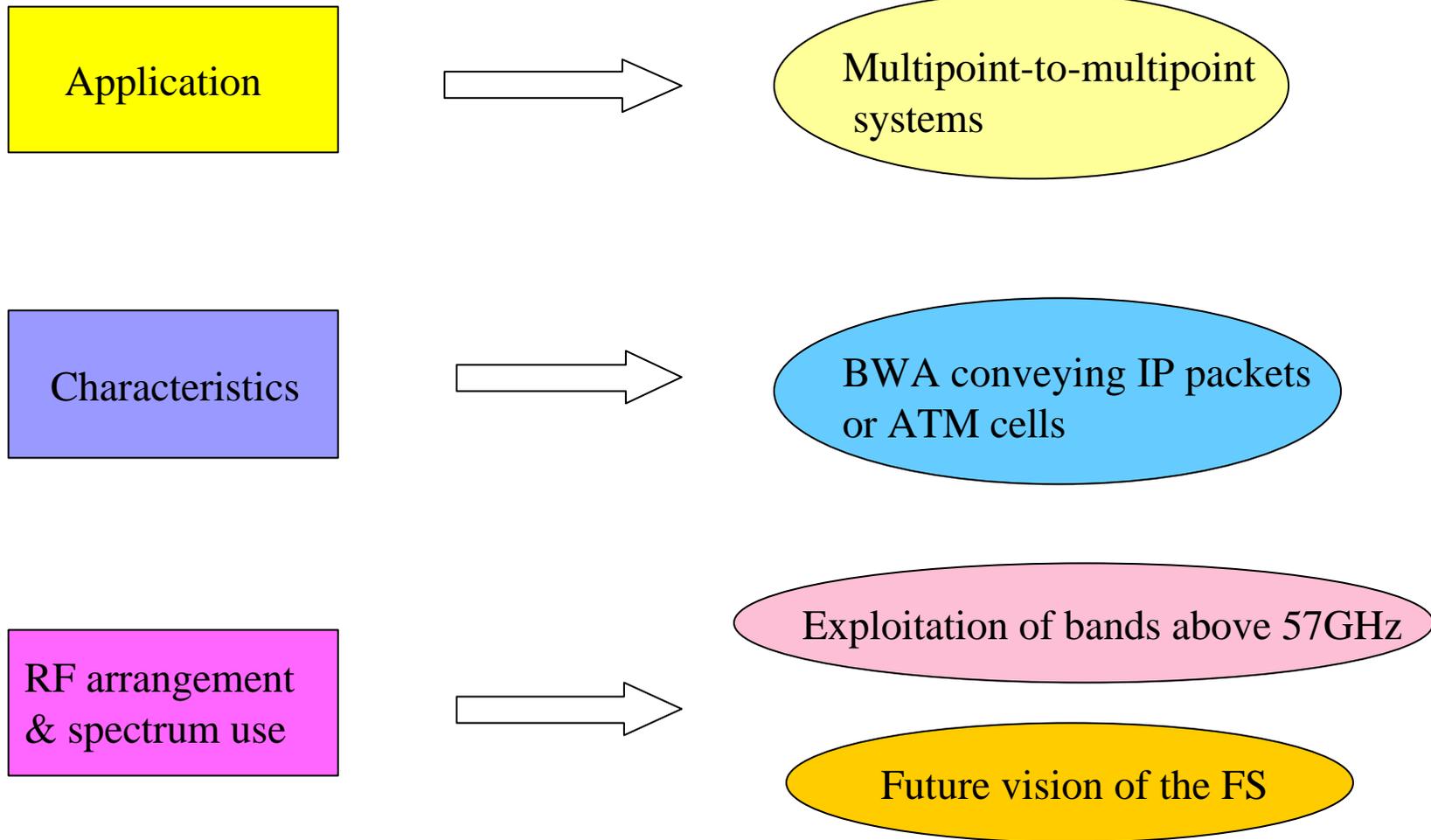
## Requirements for RLANs specified in Resolution 229 ( WRC-03)

Frequency band	Maximum Equivalent Isotropically Radiated Power ( EIRP)	Operational restriction	Mitigation measures
<b>5150-5250 MHz</b>	200 mW ( 10 mW/MHz, 0.25 mW/25 kHz)	Indoor use only	No specification
<b>5250-5350 MHz</b>	200 mW ( 10 mW/MHz ) or subject to the elevation angle mask specified in Rec.ITU-R M.1653	Basically indoor use* <sup>1</sup>  EIRP must be in accordance with the mask for outdoor use	TPC* <sup>2</sup> and DFS are required
	2W for FWA* <sup>3</sup>	Deployment restriction is subject to Rec.ITU-R F.1613	
<b>5470-5725 MHz</b>	1W ( 50 mW/MHz )	Indoor / outdoor use	

\*1 Each country is requested to take appropriate measures so that the predominant number of RLAN terminals are used indoors.

\*2 EIRP is reduced by 3 dB if not equipped with TPC.

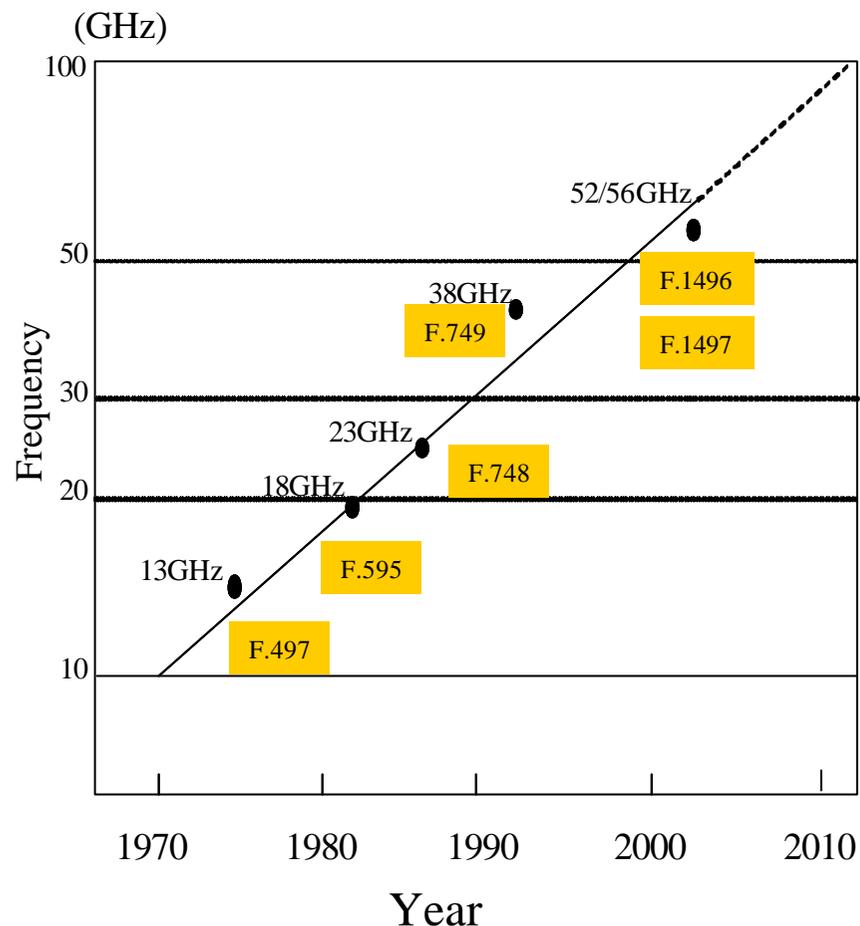
\*3 12 Countries in Region 3



# Future vision of the Fixed Service ( 1 )

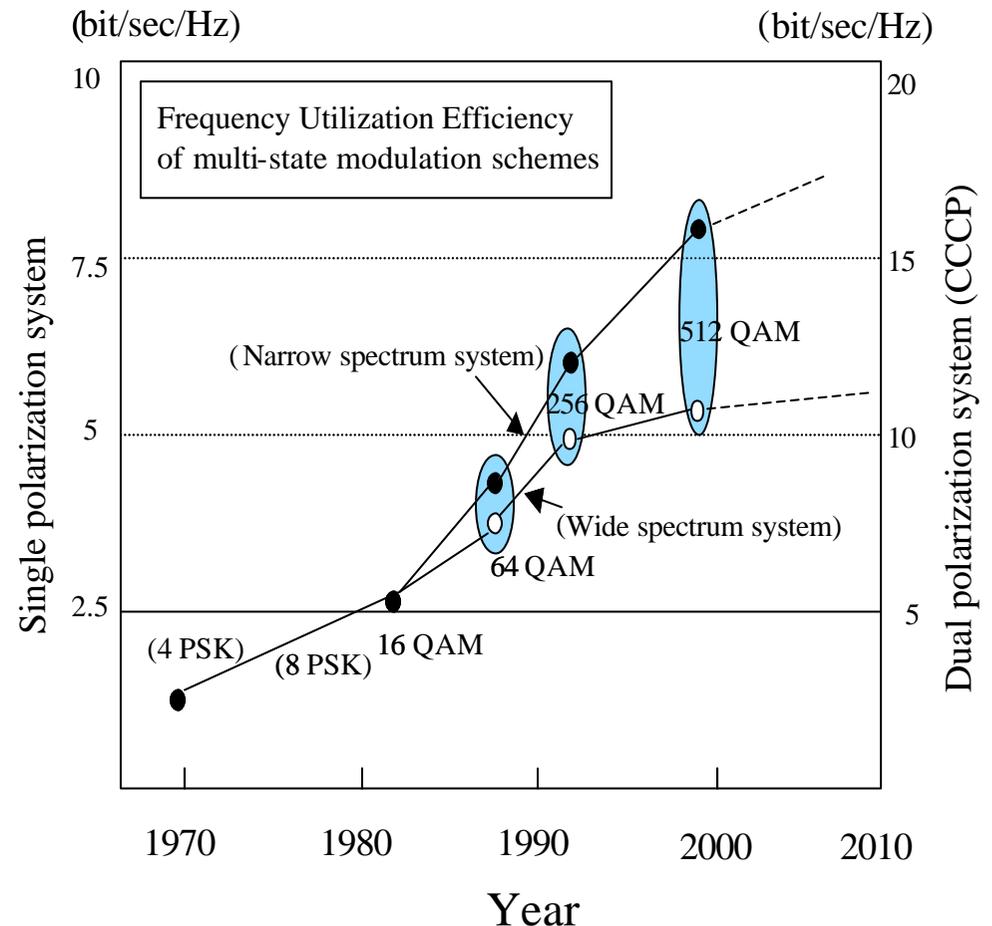
Draft new Recommendation ; Technology developments and application trends in the FS

## Exploitation of high frequency bands



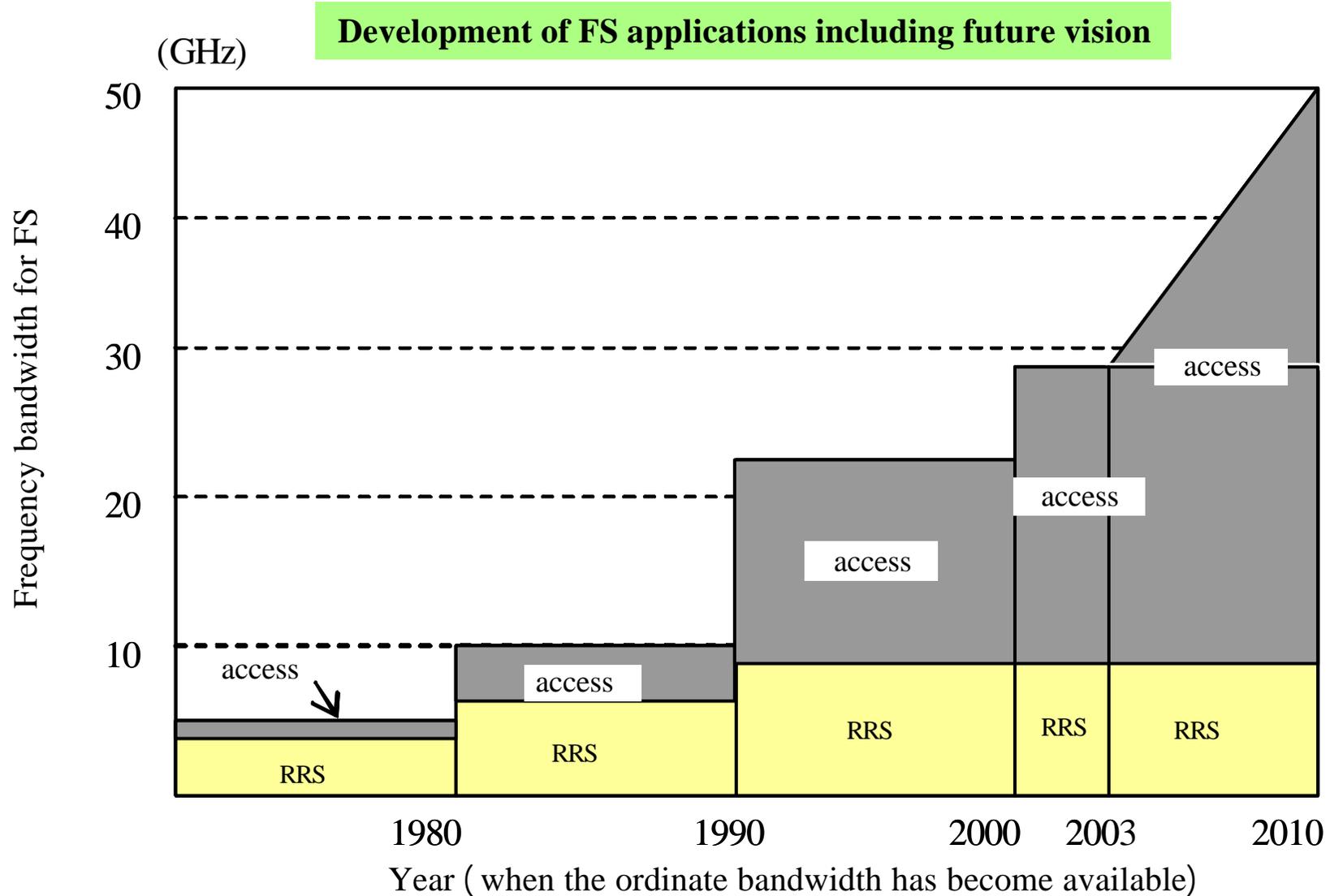
( when the ITU-R Recommendation was adopted )

## Increase of frequency utilization efficiency



( when the ITU-R Recommendation was adopted )

# Future vision of the Fixed Service ( 2 )



RRS: radio-relay systems,

access: FWA and back-haul systems, and HAPS systems in some countries

## Toward Refarming of 4 & 5GHz Bands (Example)

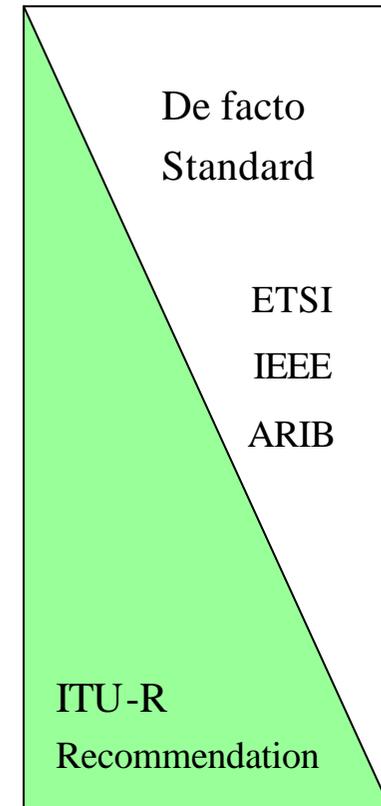
	Frequency allocation in the R.R.	Use of the band in many countries
<b>4GHz band</b> (3600-4200MHz)	3600 ————— 4200 	? Fixed wireless systems (point-to-point application)
		? Fixed-satellite links (space-to-earth direction)
		
<b>5GHz band</b> (4400-5000MHz)	4400 ————— 5000 	? FS and FSS are sharing the frequency band under the criteria specified in Recommendation ITU-R F.1565 or SF.1485.
		
		? Use of the mobile service has not been reported.

Draft Recommendation ITU-R F.[Trend] (Document 9/9)

One administration has reported that in its network use of 4 and 5 GHz frequency bands by radio-relay systems will be terminated by 2012 with a view to utilize these bands for terrestrial wireless systems for access networks including systems beyond IMT-2000.

# Scope of Standardization

Protocol stack		Specified items
Higher Layer	Application	-
	TCP	
Network layer (IP)		<ul style="list-style-type: none"> <li>· Network routing</li> <li>· Mobility management</li> </ul>
Data Link Layer	DLC Sub-layer	<ul style="list-style-type: none"> <li>· Send-receive flow control</li> <li>· ARQ control</li> <li>· QoS control</li> </ul>
	MAC Sub-layer	<ul style="list-style-type: none"> <li>· Medium access control</li> <li>· Error detection &amp; correction</li> </ul>
Physical Layer (PHY)		<ul style="list-style-type: none"> <li>· Radio frequency arrangement</li> <li>· Modulation/Demodulation</li> <li>· Transmission bit rate</li> <li>· Necessary bandwidth</li> <li>· Frequency sharing criteria</li> </ul>



TCP : Transmission Control Protocol    IP : Internet Protocol  
 MAC : Medium Access Control        DLC : Data Link Control

Recommendation ITU-R F . 1499 ( approved in 2000)

Radio transmission systems for fixed broadband wireless access

based on cable modem standards (ITU-T Recommendation J.112, Annex B)

? Complementary Recommendation

BWA specifications	PHY Layer	ITU-R F.1499
	MAC Layer and above	ITU-T J.116

? CONTENTS

1. General system requirements
2. Functional assumptions
3. Communication protocols
4. PMD sublayer specifications
5. Downstream transmission convergence sublayer

# New ITU-R Recommendation on fixed BWA

ITU-R Study Group 9 ( Working Party 9B) is developing a draft new Recommendation on fixed BWA, whose specifications are based on the standards agreed at regional standardization development organizations .

Candidate specifications for the radio interface for this Recommendation

		PHY Layer	MAC Layer
IEEE 802.16		IEEE Std. Part 16 : Air interface for fixed BWA	
ETSI BRAN	Hiper MAN	ETSI TS 102 177	ETSI TS 102 178
	Hiper Access	ETSI TS 101 999	ETSI TS 102 000
ARIB (Japan)		ARIB STD T 58 (P-P) ARIB STD T 59 (P-MP)	-

These specifications in this Recommendation will become available electronically through the website.

## Broadband Wireless Access systems ;

- are important media in access networks,
- will operate in different environments and in various frequency bands,
- will be more developed under efficient cooperation between SDOs and ITU-R.