IEEE 802 Tutorial:

IEEE 802.16 and IMT-Advanced

Monday 13 November 2006, 20:00-21:45
Hyatt Regency Dallas, Dallas, TX, USA
Landmark B

IEEE 802 Tutorial:

IEEE 802.16 and IMT-Advanced

ABSTRACT

In the International Telecommunications Union – Radio communications Sector (ITU-R), Working Party 8F has been planning the development of recommendations for radio interface specifications for international mobile telecommunications (IMT) under the moniker “IMT-Advanced.” The detailed requirements are in development, with proposal solicitation planned for early 2008. Proposals are to be based on submissions from participants, including ITU-R Sector Members such as IEEE. This tutorial reviews the background, status, and plans for IMT-Advanced. It also considers the suitability of IEEE 802.16 as the basis of a proposal for IMT-Advanced, and it overviews the draft P802.16m Project Authorization Request that would initiate the development of suitable enhancements.

IEEE 802 Tutorial:

IEEE 802.16 and IMT-Advanced

Introduction

Roger Marks
NextWave Broadband, Inc.
Chair, IEEE 802.16 Working Group

Introduction

- In the International Telecommunications Union – Radio communications Sector (ITU-R), Working Party 8F has been planning the development of recommendations for radio interface specifications for international mobile telecommunications (IMT) under the moniker “IMT-Advanced.”

- Proposals are to be based on submissions from participants, including ITU-R Sector Members such as IEEE.

- IEEE 802.16 has developed a working relationship with ITU-R.

- This tutorial
  - reviews IMT-Advanced
  - considers the suitability of IEEE 802.16 as the basis of a proposal for IMT-Advanced
  - overviews the draft P802.16m Project Authorization Request that would initiate the development of suitable enhancements

IEEE 802 Tutorial:

IEEE 802.16 and IMT-Advanced

AGENDA

8:00	Roger Marks	Introduction
8:10	José Costa	ITU-R 8F, IMT-2000, & IMT-Advanced: Standardization
8:25	Cindy-Lee Cook	IMT-Advanced: Spectrum
8:40	Carl Eklund	Opportunities for 802.16 in IMT-Advanced
8:55	Euntaek Lim	802.16 evolution to IMT-Advanced
9:10	Roger Marks	Overview of the Draft 802.16m PAR
9:20	Operator Panel	Discussion
9:45	Adjourn	

IEEE 802 Tutorial:
IEEE 802.16 and IMT-Advanced

ITU-R Working Party 8F, IMT-2000, & IMT-Advanced: *Standardization*

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Vice-Chairman, ITU-R Study Group 8

ITU-R Working Party 8F, IMT-2000, & IMT-Advanced: Standardization

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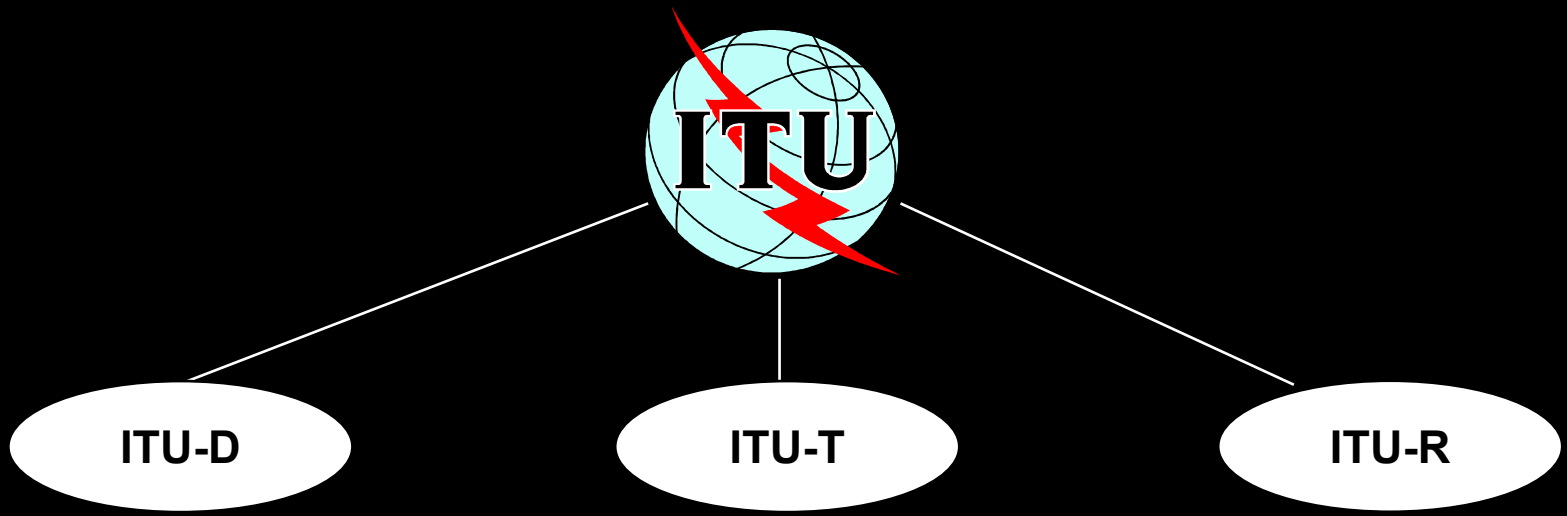
802 Tutorial: IEEE 802.16 and IMT-Advanced
Dallas, Texas, USA
13 November 2006

Outline

- ITU Organization
- International Mobile Telecommunications - 2000 (IMT-2000)
- Systems beyond IMT-2000: IMT-Advanced
- Process for the standardization of IMT-Advanced
- Summary

International Telecommunication Union



Telecommunication Development Sector

Telecommunication Standardization Sector

Radiocommunication Sector

Examples:

- Assisting developing countries

- Next Generation Networks
- Mobile telecomm networks
- Broadband cable networks

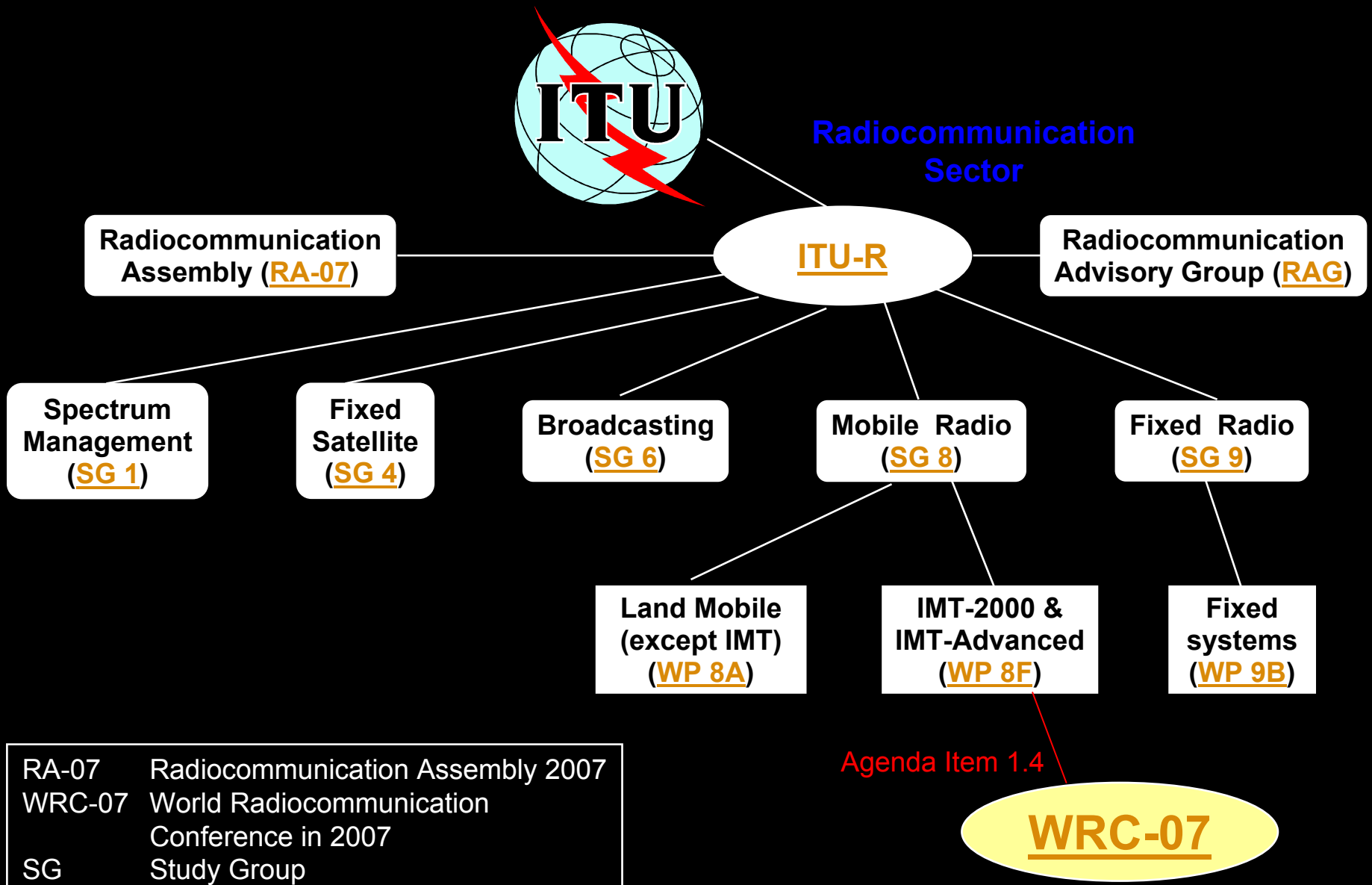
- Wireless MANs
- Radio LANs
- IMT-2000 and beyond

Study Group 2

Study Groups 9, 13 and 19

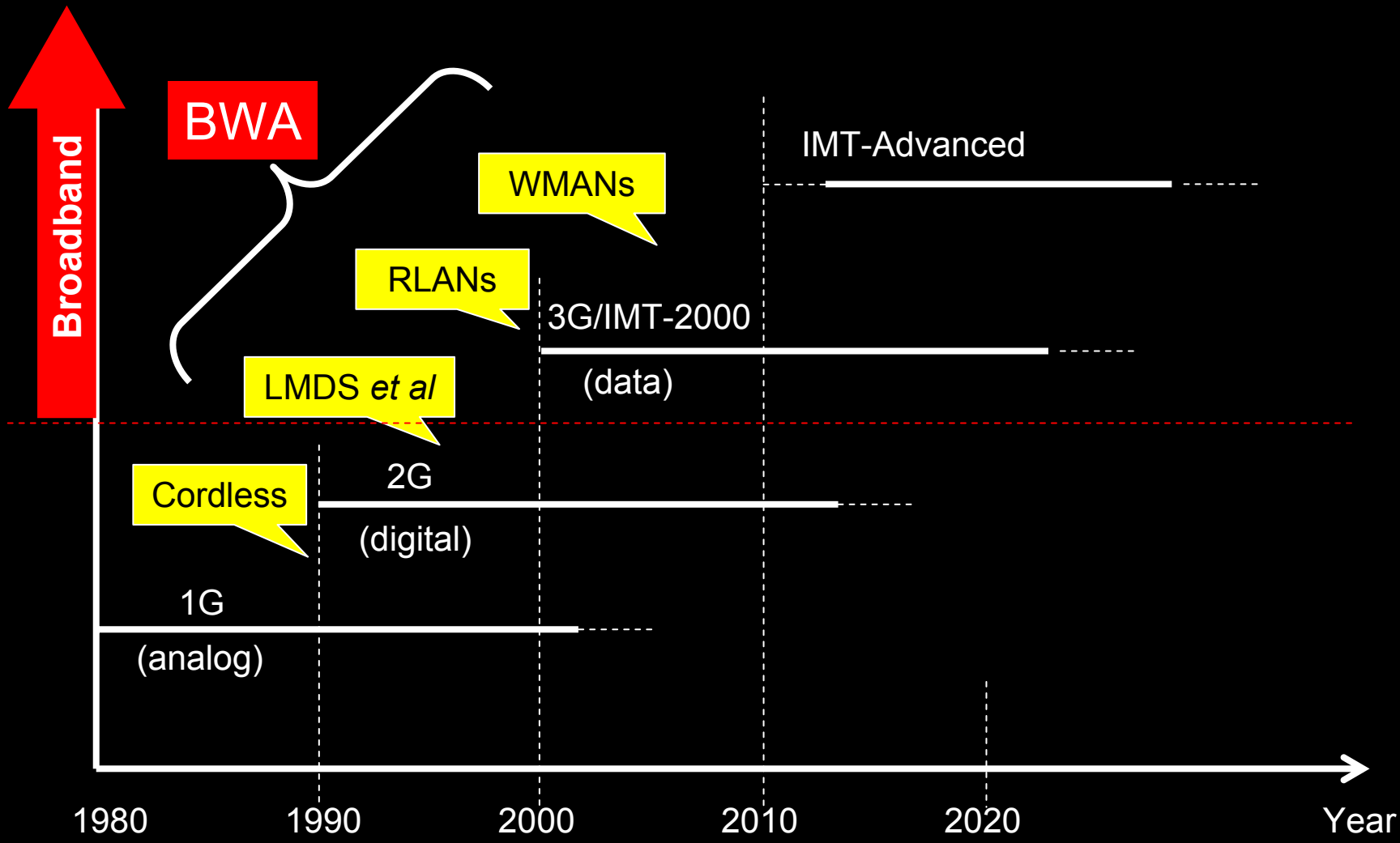
Study Groups 8 and 9

ITU-R Organization (partial view)



RA-07	Radiocommunication Assembly 2007
WRC-07	World Radiocommunication Conference in 2007
SG	Study Group
WP	Working Party

Generations of mobile wireless systems and other radio systems

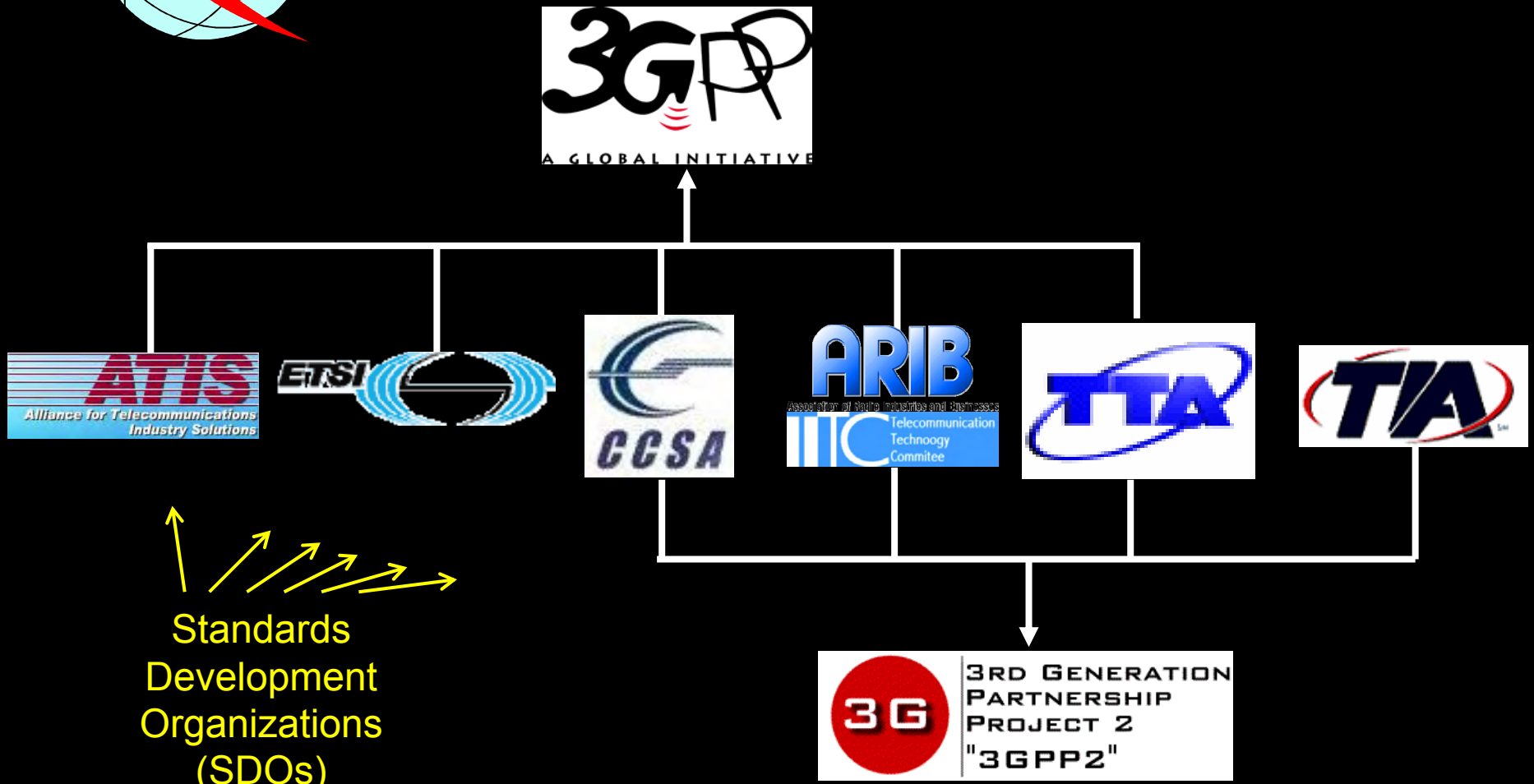


ITU-R WP 8F (IMT-2000): the terrestrial radio interfaces

(Recommendation ITU-R M.1457)

Full Name	*Common Names*
IMT-2000 CDMA direct spread	UTRA FDD WCDMA UMTS
IMT-2000 CDMA multi-carrier	CDMA2000 1x and 3x CDMA2000 1xEV-DO CDMA2000 1xEV-DV
IMT-2000 CDMA TDD (time-code)	UTRA TDD 3.84 Mchip/s high chip rate UTRA TDD 1.28 Mchip/s low chip rate (TD-SCDMA) UMTS
IMT-2000 TDMA single-carrier	UWC-136 EDGE
IMT-2000 FDMA/TDMA (frequency-time)	DECT

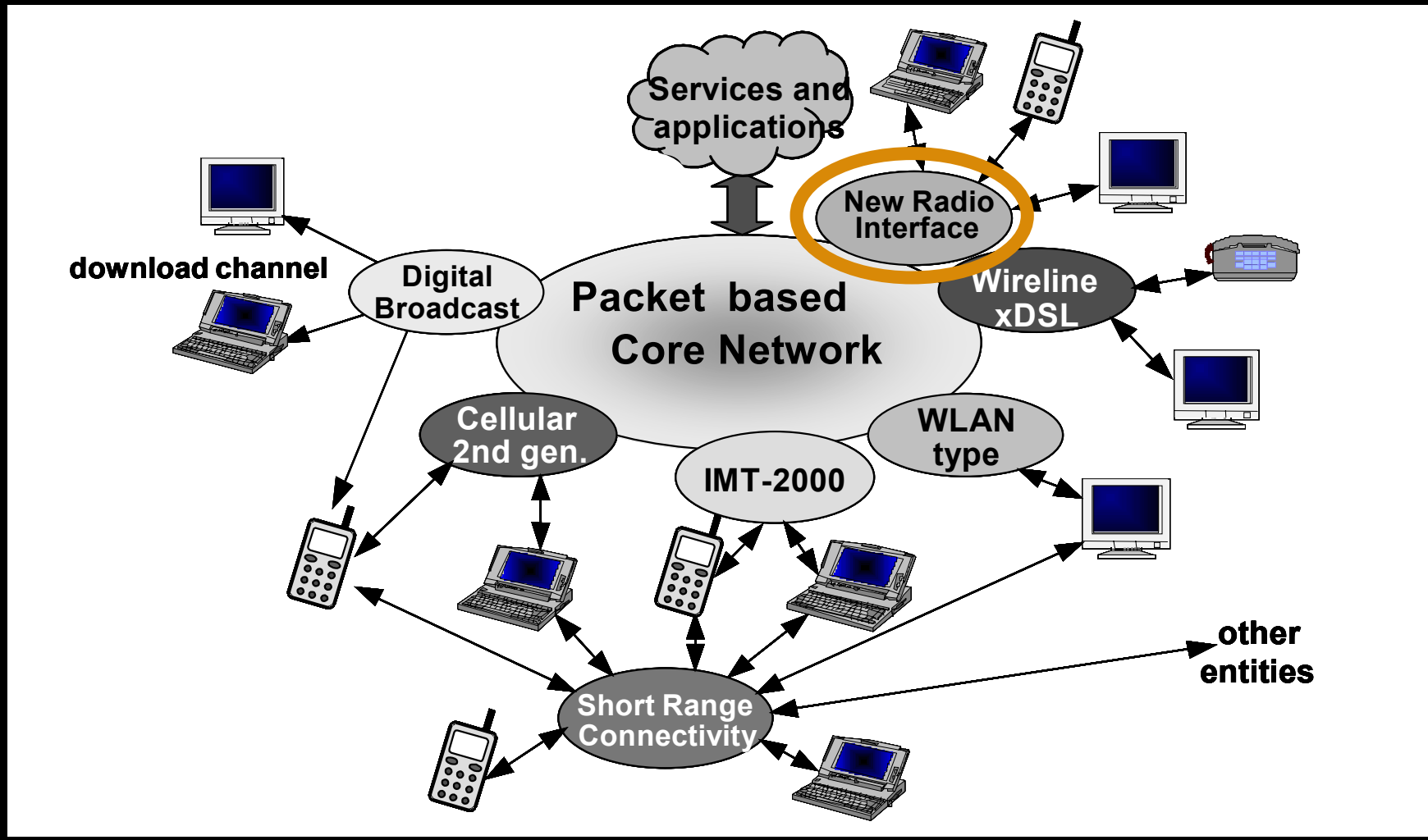
ITU and partners of the 3G Partnership Projects



Evolving Capabilities of IMT-2000 and Systems Beyond

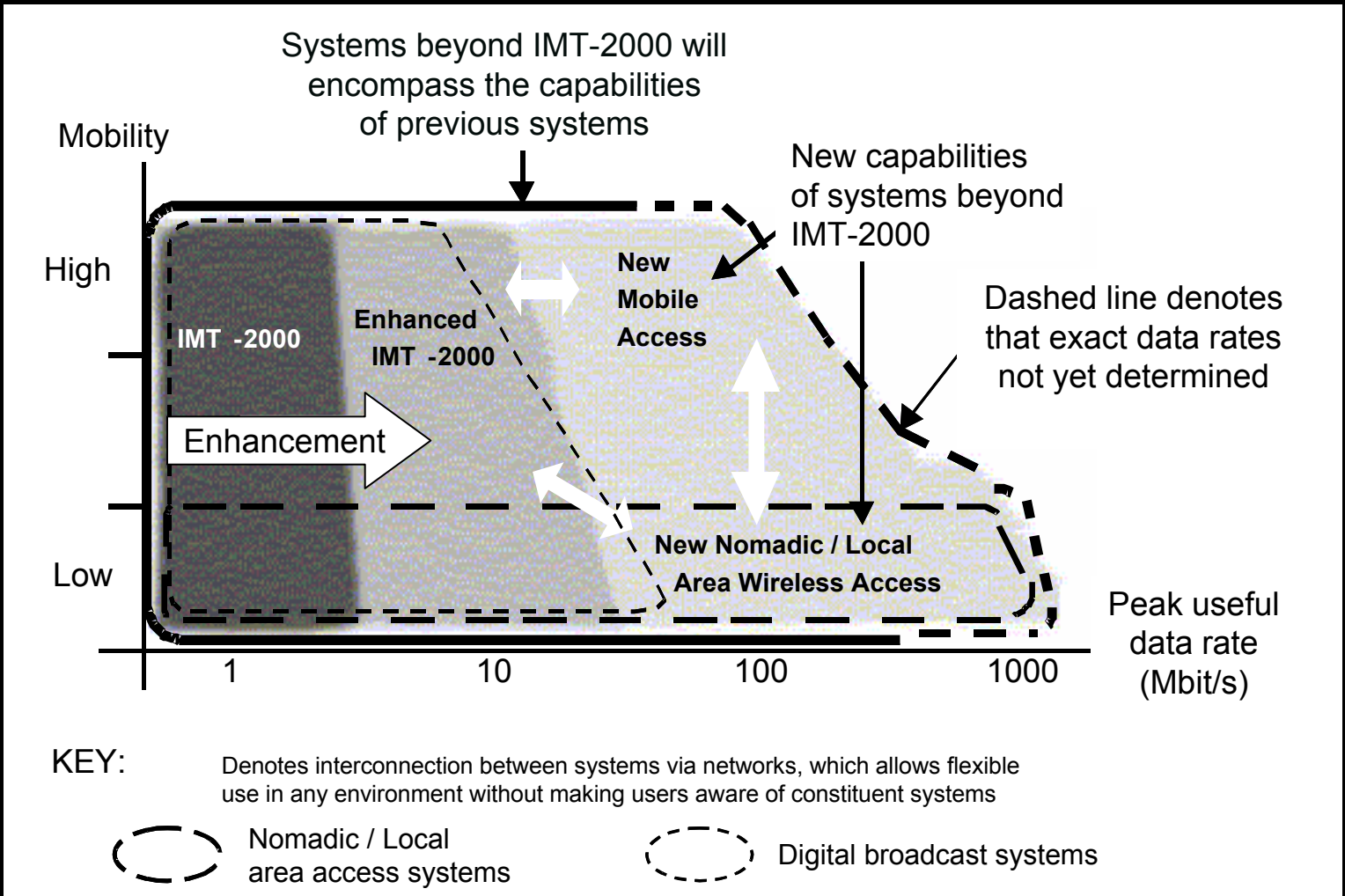
- Goal: anytime, anywhere, anyone – the deployment of IMT-2000 systems started in the year 2000
- IMT-2000 original minimum requirements for radio technology evaluation:
  - 144 kbit/s (for vehicular high speed),
  - 384 kbit/s (for medium speed), and
  - 2048 kbit/s (for indoor, low speed)
- Currently the standard supports up to about 14 Mbit/s, further enhancements are being developed.
- Research targets for IMT-Advanced include: 100 Mbit/s for high mobility and 1 Gbit/s for low mobility, for deployment after 2010.

Future network of systems with a variety of access systems



Reference: Recommendation ITU-R M.1645

Framework for Development of IMT-2000 and systems beyond (IMT-Advanced)



Reference: Recommendation ITU-R M.1645

Working document towards a Preliminary Draft New Recommendation IMT.SERV "Services delivered by IMT"

> Based on Recommendation ITU-R M.1645, “Framework and overall objectives of the future development of IMT-2000 and systems beyond IMT-2000”, and others.

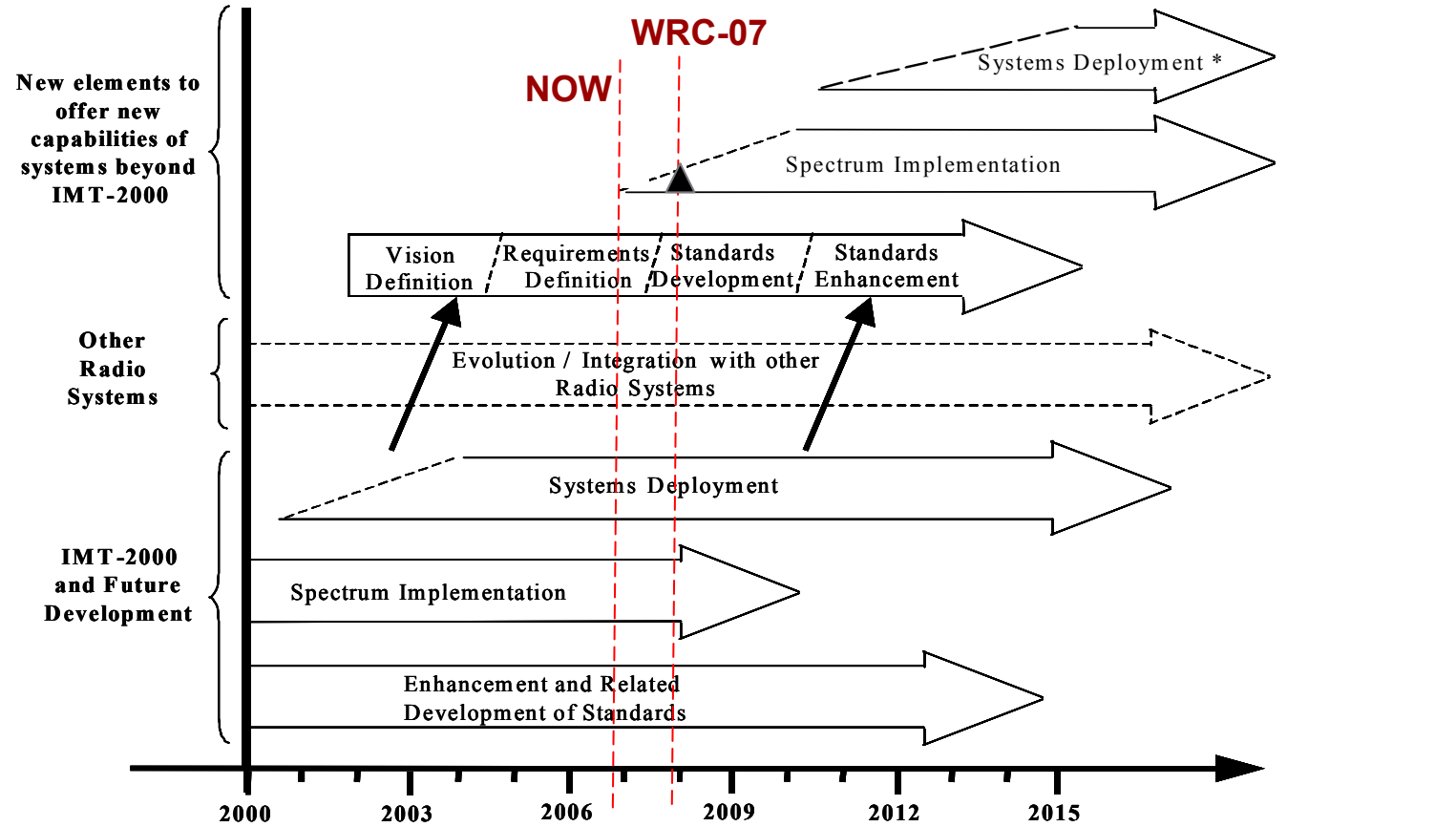
> Working document: Attachment 4.2, Document 8F/1045

> The preliminary draft outline includes

- Service descriptions
- Service enablers
- Service description parameters, and
- Service classification

> Due for completion by May 2007 (in two more meetings of ITU-R Working Party 8F).

IMT deployment & development timelines

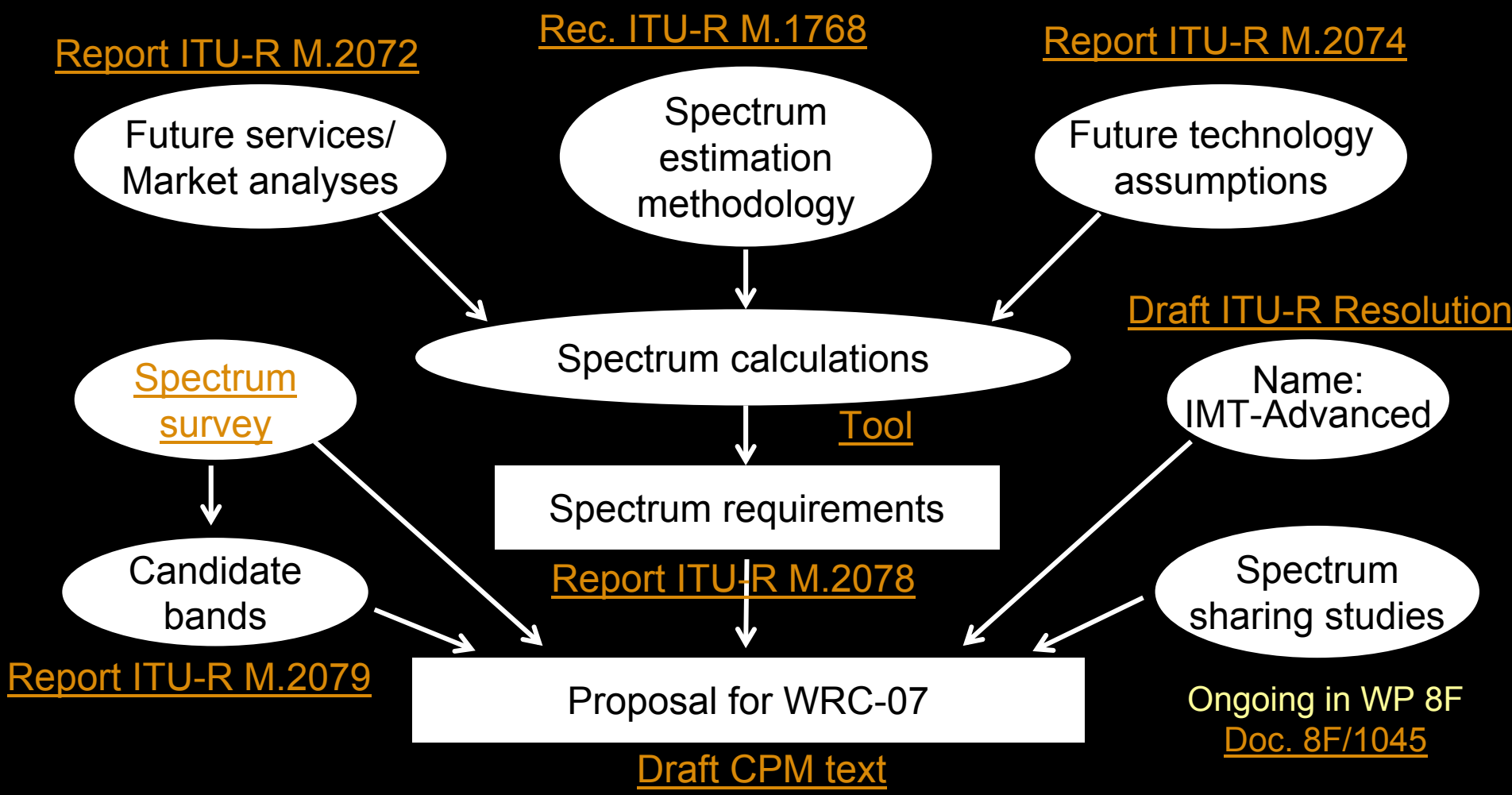


The sloped dotted lines indicate that the exact starting point of the particular subject can not yet be fixed.

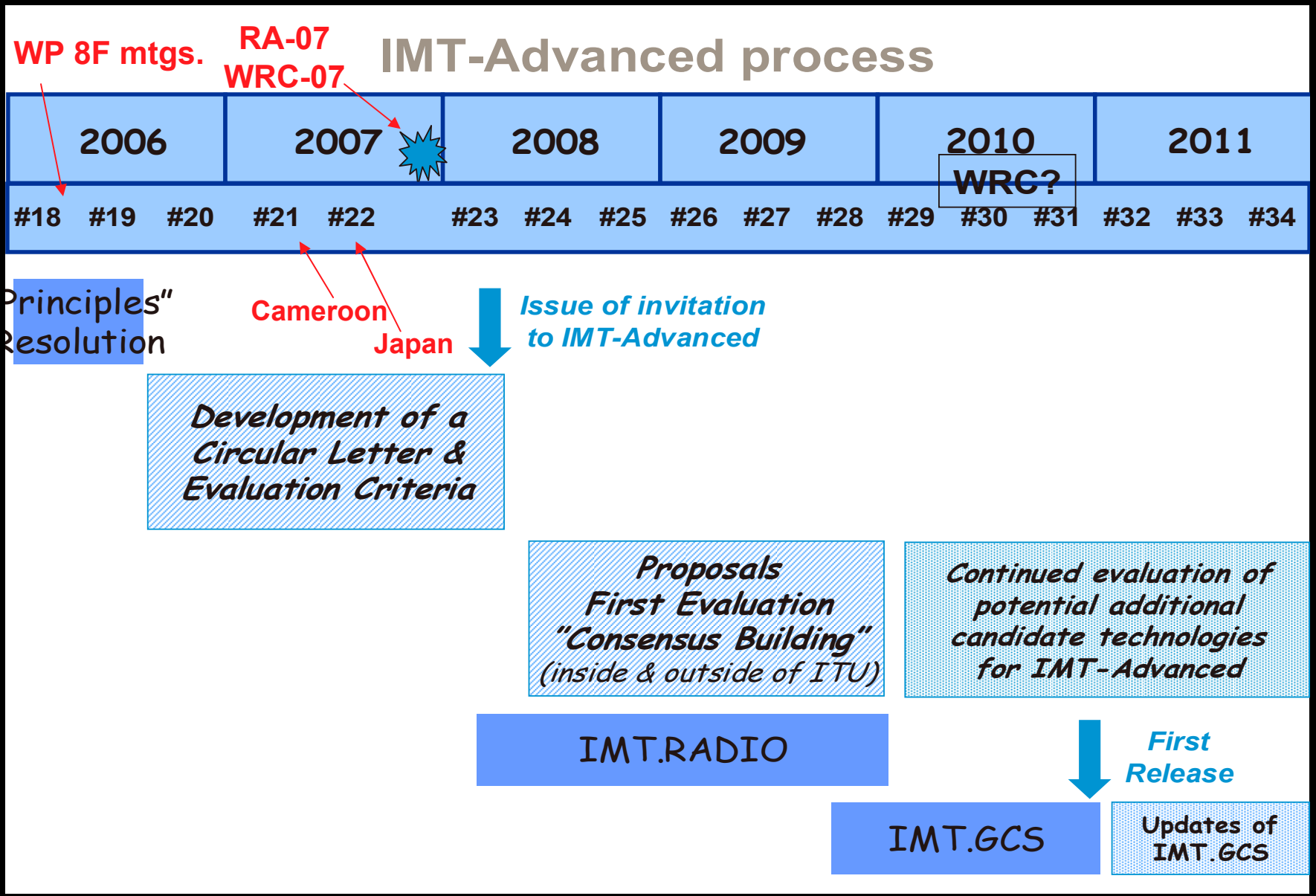
▲ : Expected spectrum identification at WRC07

* : possible wide deployment around the year 2015 in some countries

Summary of activities in ITU-R WP 8F and results to-date



Preliminary time schedule: IMT-Advanced process



Draft New Resolution ITU-R
Principles for the process of development of IMT-Advanced

shall include …

- the definition of minimum technical requirements and evaluation criteria…
- an invitation … for candidate radio interface technologies for IMT-Advanced …
- an evaluation by ITU-R of the radio interface technologies proposed for IMT-Advanced to ensure that they meet the requirements and criteria …
- consensus building with the objective of achieving harmonization … wide industry support …
- a standardization phase where the ITU-R develops the IMT-Advanced radio interface specification Recommendation(s) based on … an evaluation …
- reviews of the minimum technical requirements and evaluation criteria … designated as separately identifiable versions for IMT-Advanced … include review of existing versions to determine whether they should remain in force …
- an ongoing and timely process where new radio interface technology proposals may be submitted and existing radio interface specifications can be updated …

Reference: Ex-Doc. 8/157, which will eventually be posted here: http://www.itu.int/md/R03-SG08-RP/en

Initial structure of ITU-R Circular Letter to invite proposed candidate radio interface technologies for IMT-Advanced

Circular Letter		Existing & Ongoing work	New task
Main Body			*Circular Letter*
Annex 1	Background on IMT-Advanced	- Recommendation ITU-R M.1645 - Resolution [Naming] - Resolution [IMT. PRINCIPLE] - Common Text	
Annex 2	Submission and evaluation process and consensus building - Time-schedule	- Resolution [IMT. PRINCIPLE] - Workplan Document	
Annex 3	Requirements related to service capabilities	[IMT.SERV]	
Annex 4	Requirements related technical system performance (Minimum technical performance capabilities for IMT-Advanced candidate radio interface technologies)	[IMT.Radio Aspect]	- *Technical requirement and performance criteria*
Annex 5	Spectrum related requirements Note: This item may depend on the outcome of WRC-07		WRC-07 Resolutions and other relevant documents
Annex 6	Submission guidelines & template for details of submission	-	
Annex 7	Evaluation guidelines and test models	-	
Annex 8	Relevant ITU-R Recommendations, Reports and others	ITU-R documents	
Annex 9	IPR policy	Resolution ITU-R 1-4	-

Reference: Chapter 7, Document 8F/1045

Summary

- Have shown the organization of ITU-R related to IMT-2000 and IMT-Advanced standardization and spectrum.
- Have described the activities on the ongoing development of IMT-2000 and IMT-Advanced.
- Have described the WP 8F results to-date and the planned process for the standardization of IMT-Advanced.
- The deployment of wireless access systems will take place on a market led basis; including regulatory considerations.

References

- ITU Radio Regulations, 2004
  http://www.itu.int/publications/folderdetails.aspx?lang=e&folder=R-REG-RR-2004&menu=categories
- Recommendation ITU-R M.1457, “Detailed specifications of the radio interfaces of IMT-2000”, 2006.
  http://www.itu.int/rec/recommendation.asp?type=folders&lang=e&parent=R-REC-M.1457
- Recommendation ITU-R M.1645, “Framework and overall objectives of the future development of IMT-2000 and systems beyond IMT-2000”, 2003.
  http://www.itu.int/rec/recommendation.asp?type=folders&lang=e&parent=R-REC-M.1645
- ITU-R Wireless Access Systems Portal
  http://www.itu.int/ITU-R/study-groups/was/index.html
- ITU-R Handbook on “Land Mobile (including Wireless Access) Volume 2: Principles and Approaches on Evolution to IMT-2000 ”, 1997
  http://www.itu.int/pub/R-HDB-30-1997/en
- ITU Handbook on “Deployment of IMT-2000 Systems”, 2003.
  http://www.itu.int/itudoc/gs/imt2000/84207.html
- “Migration to IMT-2000 Systems” - Supplement 1 to the Handbook on Deployment of IMT-2000 Systems
  http://www.itu.int/pub/R-HDB-46-2005/en

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IEEE 802 Tutorial:

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IMT-Advanced: *Spectrum*

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IMT-Advanced: Spectrum

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New Wireless Services & Technologies
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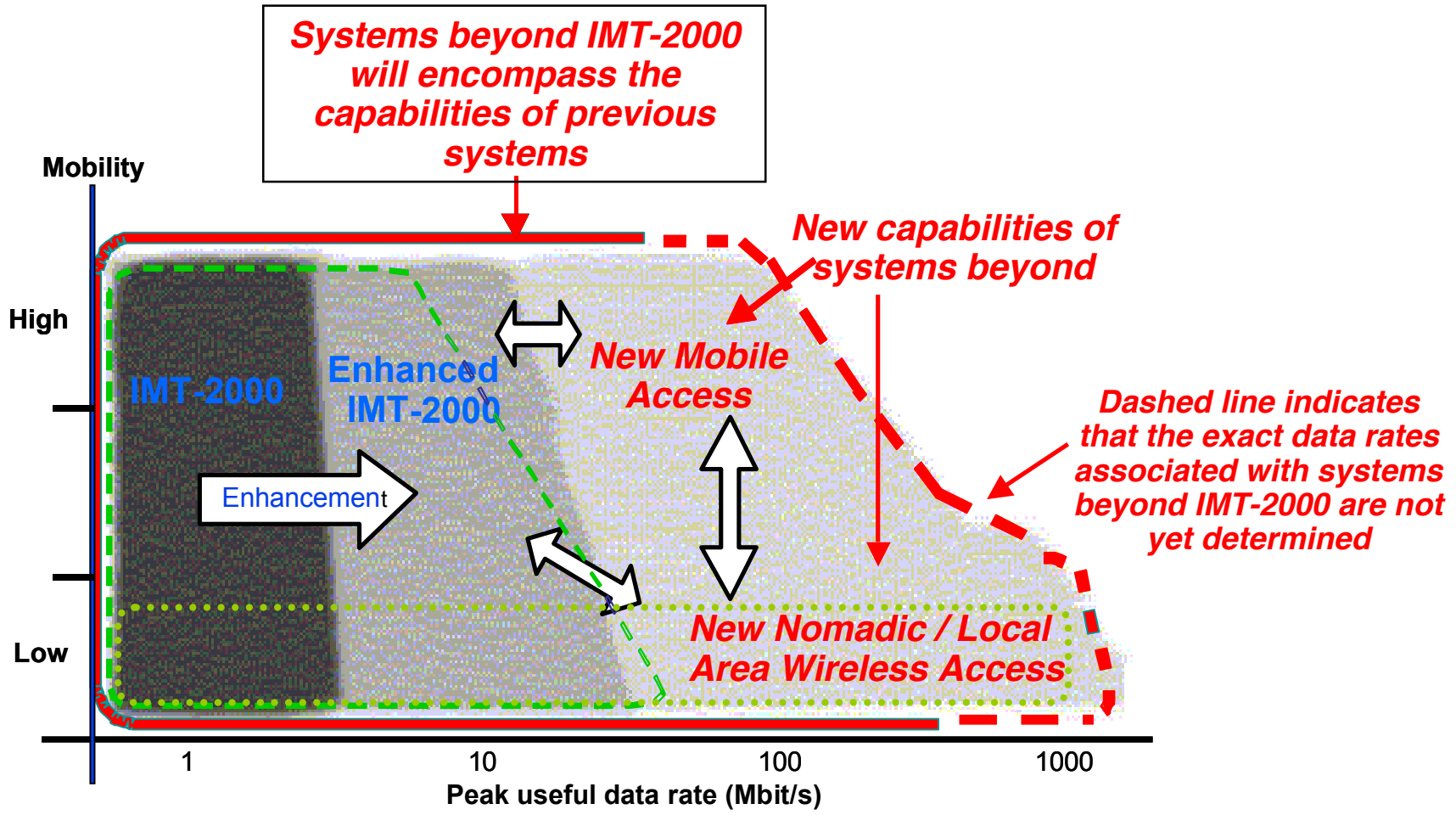
Topics Covered

- Agenda Item 1.4, WRC-07
- Spectrum Implications
- Spectrum Estimates
- Candidate Bands
- IMT Identification in RR
- Conclusion

IMT Framework



Agenda Item 1.4

2007 World Radiocommunication Conference

Agenda item 1.4

"to consider frequency-related matters for the future development of IMT_2000 and systems beyond IMT_2000, taking into account the results of ITU_R studies in accordance with Resolution 228 (Rev.WRC_03)"

WRC Agenda Item 1.4

- Under Agenda Item 1.4 studies are being conducted on:
  - The amount of spectrum, if any, needed for the evolution of IMT-2000 systems and for IMT-Advanced systems
  - Candidate bands for this spectrum

- Spectrum needs are expected to vary from Region to Region and country to country

Spectrum Implications

- In analysing the spectrum implications of the future development of IMT, many issues must be addressed, including:
  - Traffic projections & requirements
  - Service & application requirements
  - Spectrum efficiency
  - Radio transmission characteristics
  - Global roaming requirements & harmonized use of spectrum
  - Technical solutions to facilitate global roaming
  - Techniques of dynamic spectrum sharing
  - Sharing and compatibility analysis
  - Evolution of IMT-2000 systems

Spectrum Estimates

"The predicted total spectrum bandwidth requirement for both the RATG1 and RATG2 [pre-IMT-2000, IMT-2000 and IMT-Advanced] for the **year 2020** is calculated in this Report to be **1 280 MHz** (including spectrum already in use, or planned to be used, for RATG1). The calculations developed the spectrum bandwidth requirements ranging from 1 280 MHz to 1 720 MHz (including spectrum already in use, or planned to be used, for RATG1) which represented a lower and higher market setting as developed from the data in IMT.MARKET. It should be noted that this lower figure (1 280 MHz) is higher than the requirements for some countries. In addition there are some countries where the requirement is larger than the higher value (1 720 MHz)."

Report ITU-R M.2078

Spectrum Estimates ...2

- 32 spectrum estimation scenarios were considered, 16 each for the low and high markets
- RATG1 includes all pre-IMT-2000 and IMT-2000 spectrum, RATG2 is IMT-Advanced spectrum
- Spectrum already identified for pre-IMT and IMT-2000 systems must be subtracted from total
- There is also a view that around 50% of the resulting net spectrum estimate will be for nomadic applications and therefore could come from spectrum above 5 GHz
- Spectrum requirements could also be significantly higher for some Regions (e.g., Asia)

Spectrum Estimates ...3

Predicted spectrum requirements by the year 2020 for IMT

		Region 1		Region 2		Region 3	
User demand setting	**Predicted total (MHz)**	**Identified (MHz)**	**Net additional (MHz)**	**Identified (MHz)**	**Net additional (MHz)**	**Identified (MHz)**	**Net additional (MHz)**
Low	1280	693	587	723	557	749	531
High	1720	693	1027	723	997	749	971

Note to Table: Prediction based on one network deployment

Candidate Bands

Candidate bands for IMT (Report ITU-R M.2079)

- 410 - 430 MHz
- 450 - 470 MHz
- 470 – 806/862 MHz
- 2 300 - 2 400 MHz
- 2 700 - 2 900 MHz
- 3 400 – 4 200 MHz
- 4 400 – 4 990 MHz

- All these bands are going forward to WRC-07 for consideration as there was no agreed process to narrow down the list
- Advantages and disadvantages provided for each band
- No consensus on the candidature or suitability of any of these bands as prospects for identification for IMT

Candidate Bands

450 – 470 MHz:

- 450-470 MHz is being considered by many countries for future development of IMT-2000 (not for IMT-Advanced) and in particular for extended coverage
- Technology already exists in this band for IMT – CDMA450
- In some countries, IMT-2000 networks have already been deployed in this band
- In some countries, band is heavily used by other land mobile services, e.g., for PPDR

Candidate Bands

470 - 806/862 MHz:

- 806/862: Depending on the region the band limit is in between 806 and 862 MHz. In North America, the band goes up to 806 MHz
- Introduction of DTV opens the opportunity to consider other services in portions of the band after the transition from analogue TV, example 698 – 806 MHz
- In some countries, portions of the band are also used for other services (e.g., radio astronomy, PPDR, etc.)

Candidate Bands

2 300 - 2 400 MHz:

- In some countries, band is used for applications such as aeronautical telemetry, non-mobile wireless broadband services, etc.
- Some administrations are planning to use this band for IMT-2000

2 700-2 900 MHz:

- Allocated on a primary basis and used for aeronautical radionavigation, a safety of life service
- previous studies have shown that sharing of IMT with radiolocation and radionavigation is not feasible
- Also used for meteorological radar systems

Candidate Bands

3 400 - 4 200 MHz: Multiple sub-band possibilities

- 3 400 – 3 600 MHz
  - No primary mobile allocation
  - Some countries use parts of this sub-band for radiolocation
  - Potential use for WiMAX technology which may eventually fall under the IMT family
- 3 600-3 700 MHz
  - Some countries are looking at portions of this band for IMT while others have FSS in this sub-band
- 3700-4200 MHz
  - Heavily used for FSS and therefore significant international opposition
  - May be favoured in Asia for IMT

Candidate Bands

4 400 – 4 990 MHz:

- Size of band could accommodate large frequency block(s) for some IMT-Advanced systems
- Some countries use this band for government services including aeronautical mobile
- Harmonized band in NATO countries
- In some countries the band is intensively used for Fixed Services
- Sub-band 4 500-4 800 MHz used by FSS; also covered by the provisions of RR Appendix 30B, a complex matter being reviewed by WRC-07

Identification for IMT

- Spectrum currently identified for use by IMT-2000 is specified in footnotes in the Radio Regulations, e.g.:

5.384A The bands, or portions of the bands, 1 710-1 885 MHz and 2 500-2 690 MHz, are identified for use by administrations wishing to implement International Mobile Telecommunications-2000 (IMT-2000) in accordance with Resolution **223 (WRC-2000)**. This identification does not preclude the use of these bands by any application of the services to which they are allocated and does not establish priority in the Radio Regulations.

Identification for IMT

- Additional spectrum bands may be identified by one of three methods as provided in the CPM text
- Should new spectrum be identified for IMT-2000, IMT-Advanced or IMT (which includes both IMT-2000 and IMT-Advanced)? and Should text in old footnotes be changed so that the current spectrum can also be used for IMT-Advanced?

Method	Current footnote identifications	New identifications
1a	IMT	IMT
1b	IMT-2000 (unchanged)	IMT
2	IMT-2000 (unchanged)	IMT-2000 and/or IMT-Advanced
3	No footnotes	No footnotes

Conclusion

- Spectrum aspects for IMT systems will be considered at WRC-07
- How much additional spectrum is really needed?
- No agreement internationally on candidate bands – is global harmonization possible?
- How much spectrum can we really find/make available?
- How should spectrum be identified for use in the Radio Regulations?

Thank You

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New Wireless Services & Technologies
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Opportunities for 802.16 concerning ITU-R work on IMT-Advanced

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Nokia, Inc.
former Vice Chair, IEEE 802.16 Working Group

IEEE 802 Tutorial: Opportunities for 802.16 concerning ITU-R work on IMT-Advanced

Carl Eklund, Nokia

November 13th, Dallas, TX

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Outline

1. Introduction
2. General IMT-Advanced timeline in ITU-R WP8F
3. Opportunities for contributions
4. Circular letter draft structure
5. Contribution process
6. Expected outcome of the contribution process
7. Conclusions

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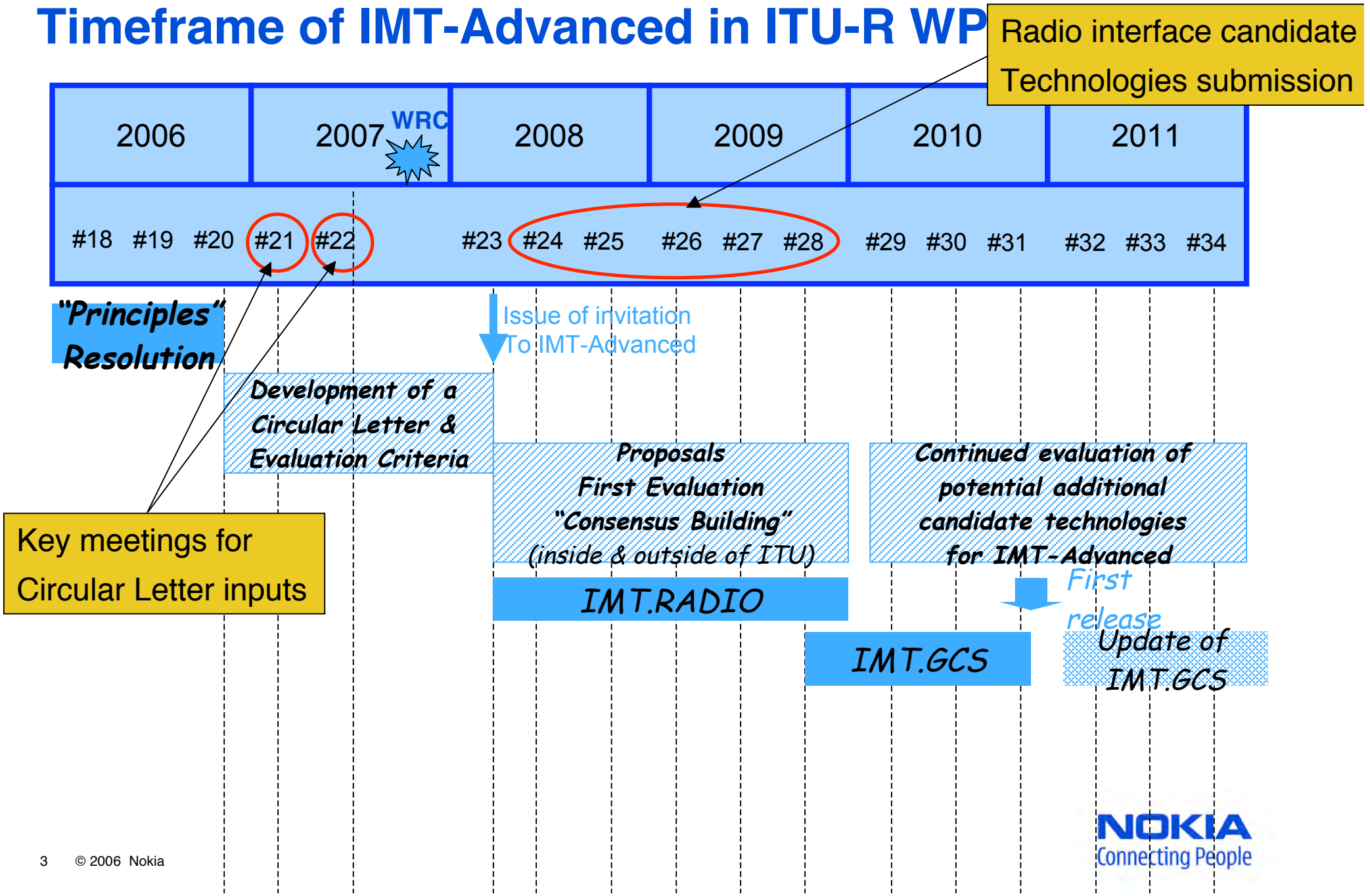
Timeframe of IMT-Advanced in ITU-R WP



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What kind of contributions 802.16 can make?

- First stage: Minimum technical requirements and evaluation criteria for the circular letter
  - ITU-R WP8F meetings #21-#22 (January-May 2007)
- Second stage: IMT-Advanced Radio Interface Technology proposal
  - ITU-R WP8F meetings #24-#28 (2008-2009)
- Third stage: Evaluation of IMT-Advanced Radio Interface Technology proposals
  - ITU-R WP8F meetings #24-#28 (2008-2009)
- Fourth stage: contributions to the global core specification (IMT.GCS)
  - End of 2009 onwards

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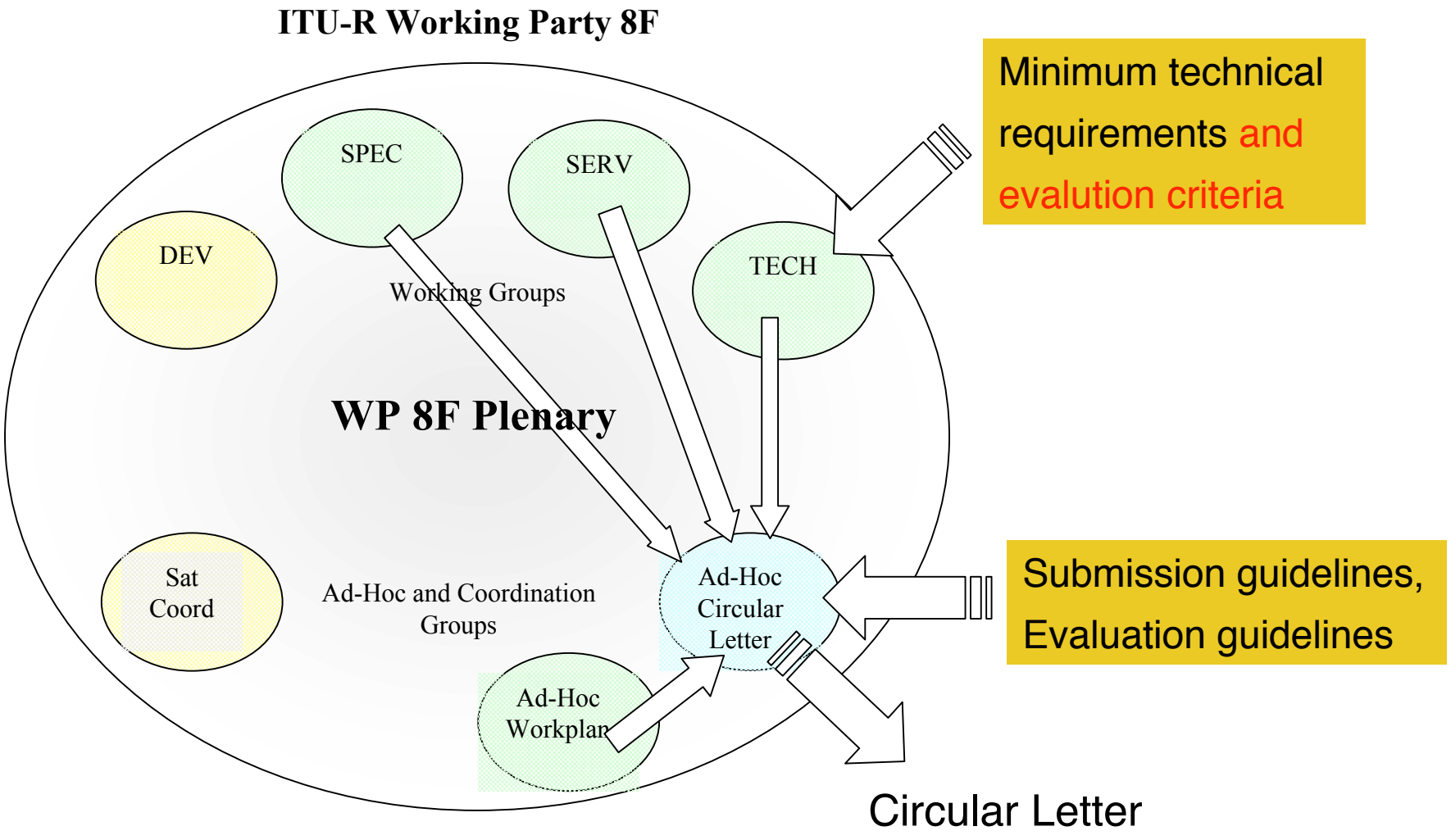
Development of the circular letter in WP8F



Circular letter in more detail

- ITU-R WP8F will develop the circular letter for IMT-Advanced in its next three meetings.
- Circular letter is to be finalized at meeting #23 of WP8F in Feb 08, then sent out to Member States, Sector Members etc
- Circular letter will also spell out the evaluation guidelines and test models

Source: ITU-R Ad-Hoc Circular Letter

Circular Letter		Existing & Ongoing work	New task	Responsible WG with WP 8F
Main Body			*Circular Letter*	AH-Circular Letter
Annex 1	Background on IMT-Advanced	- Recommendation ITU-R M.1645 - Resolution [Naming] - Resolution [IMT. PRINCIPLE] - Common Text		WG-Service
Annex 2	Submission and evaluation process and consensus building - Time-schedule	- Resolution [IMT. PRINCIPLE] - Workplan Doc.		AH-Workplan
Annex 3	Requirements related to service capabilities	[IMT.SERV]		WG-Service
Annex 4	Require ments related technical system performance (Minimum technical performance capabilities for IMT-Advanced candidate radio interface technologies)	[IMT.Radio Aspect]	*Technical requirement and performance criteria*	WG-Technology
Annex 5	Spectrum related requirements Note: This items may depend on the outcome of WRC -07		WRC -07 Resolutions and other relevant documents	WG-Spectrum
Annex 6	Submission guidelines & template for details of submission	-		T.B.D.
Annex 7	Evaluation guidelines and test models	-		T.B.D.
Annex 8	Relevant ITU-R Recommendations, Reports and others	ITU-R documents		T.B.D.
Annex 9	IPR policy	Resolution ITU -R 1-4	-	

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What kind of contributions to provide for Circular Letter work?

- Material is basically already available for some of the Annexes
- Contributions are to address especially
  - Requirements related to technical system performance
  - Evaluation guidelines and test models
- ITU-R WP8F WG Technology is expected to start discussing requirements related to technical system performance in the January 2007 meeting in Cameroon.
- Contribution deadline to ITU-R WP8F #21 is Wednesday, January 10th, 2007

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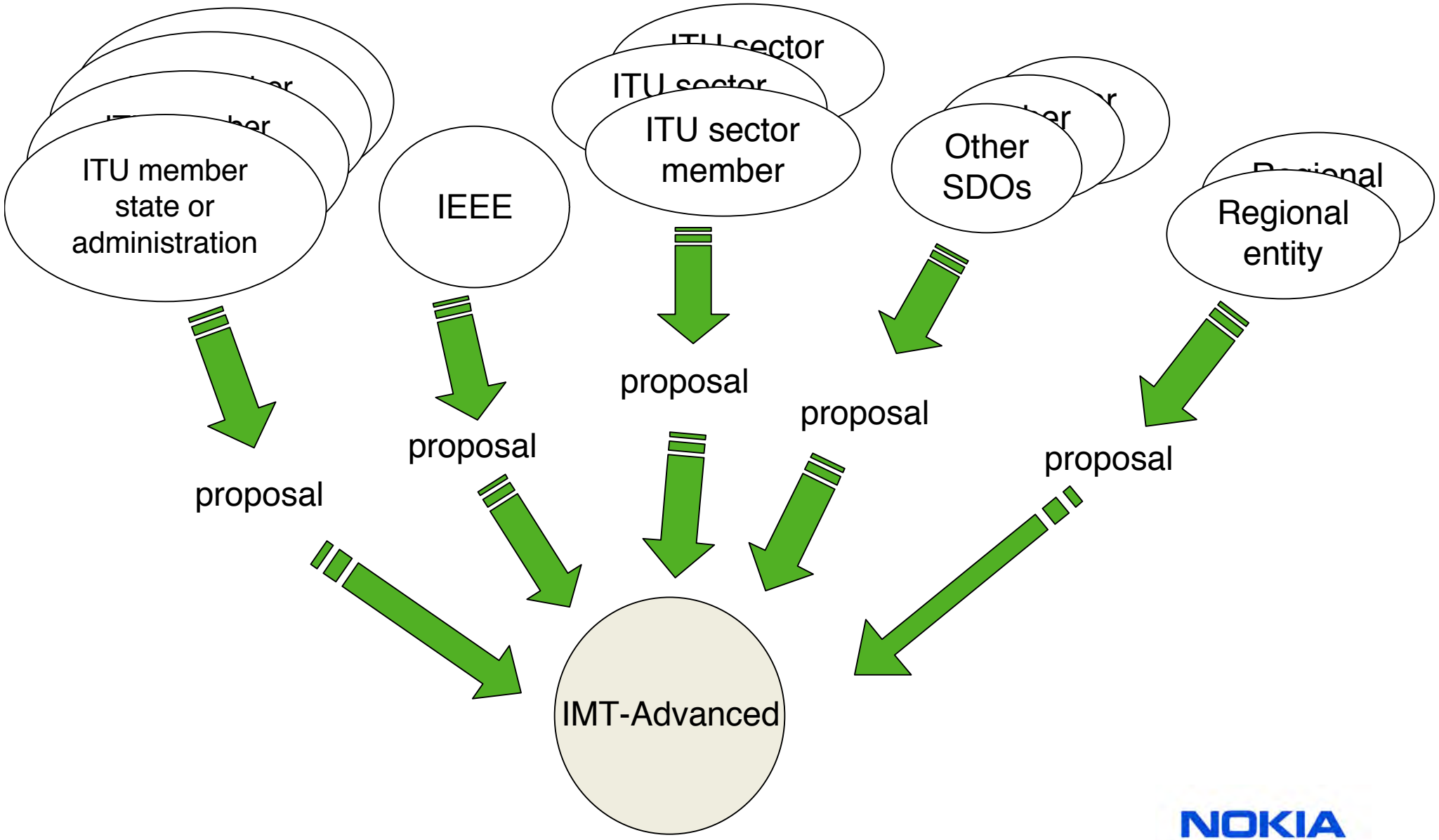
IMT-Advanced Radio Interface Technology proposals



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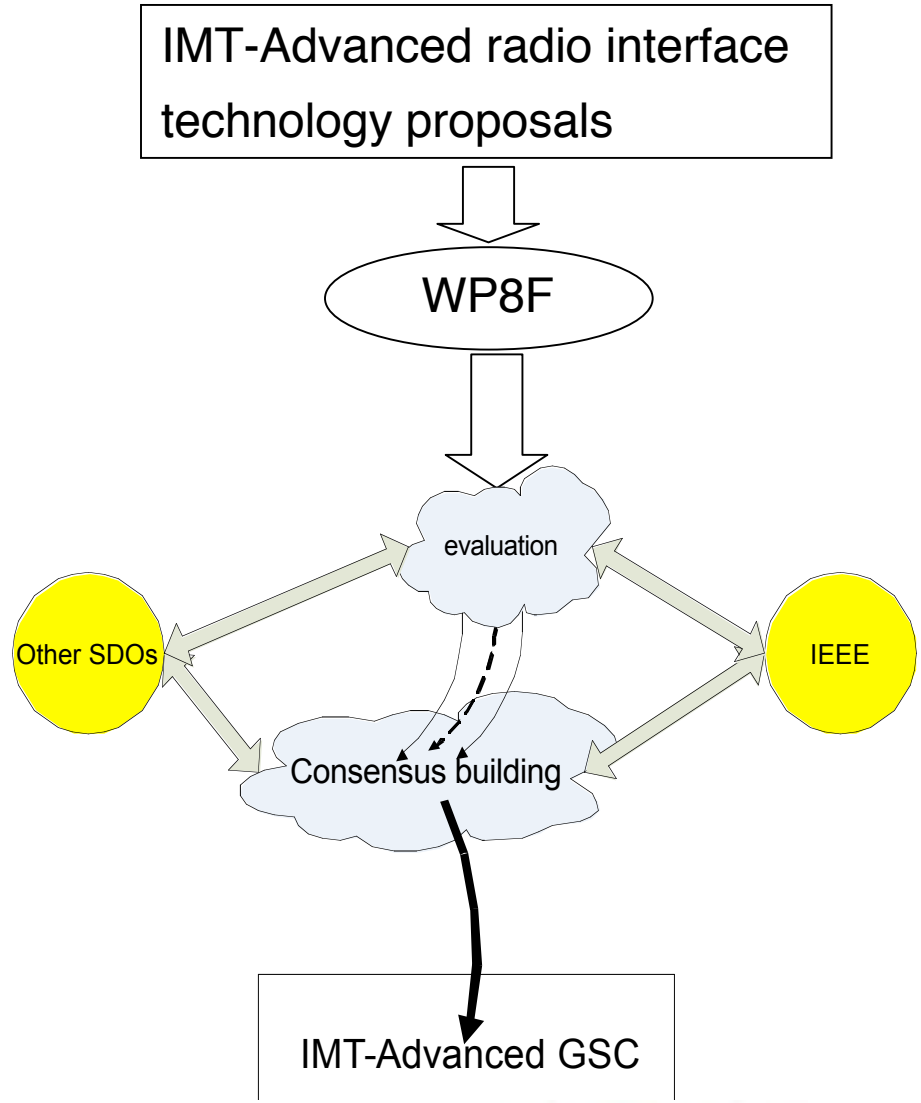
Contribution process

- Any ITU Member (e.g. Administration, Sector Member) and interested external organizations may propose radio interface technologies for IMT-Advanced.
- The candidate proposals can be submitted once the Circular Letter is out – within 2008-2009
- The evaluation of the proposed candidate radio interface technologies will also take place during 2008-2009
- The expectation is that external organizations such as SDOs in their role as Evaluation Groups can submit evaluations of the candidates to WP 8F.
- Any consensus building is also expected to take place among external organizations



Expected outcome of the contribution process

- A number of radio interface technologies will be proposed to ITU-R WP8F during 2008-2009
- The proposed technologies will be evaluated to fulfill the agreed requirements set at WP 8F
- The content of the eventual global core specification (IMT.GCS) depends on the outcome of any consensus building process
- There may be several radio interface technologies identified as IMT-Advanced in IMT.RADIO

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Conclusions

- ITU provides a framework for a truly global standards and regulatory process
- IMT-Advanced process is now starting and ITU will issue a call for proposals by Circular Letter during early 2008
- Discussion ongoing about requirements and evolution criteria
- Open process that IEEE 802.16 can contribute in
- Now is the right time to approve the 802.16m PAR for IEEE 802.16 to participate in the IMT-Advanced process

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802.16 evolution to IMT-Advanced:
Requirements and Feasibility

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Samsung Electronics

802.16 Evolution to IMT-Advanced: Requirements and Feasibility

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Samsung Electronics

ITU Rec./Reports

1. Rec. ITU-R M.1645, "Framework and overall objectives of the future development of IMT-2000 and systems beyond IMT-2000." (2003)
2. Rep. ITU-R M.2038, "Technology Trends" (2004)
3. Rep. ITU-R M.2074, "Radio aspects for the terrestrial component of IMT-2000 and systems beyond IMT-2000" (2005)
4. Draft New Report on Spectrum Requirement Estimation for IMT-Advanced
   (In progress for approval) (2006)

ITU-Advanced Vision

Trends in Services

Variety of services and applications

Ubiquitous coverage and enhanced mobility

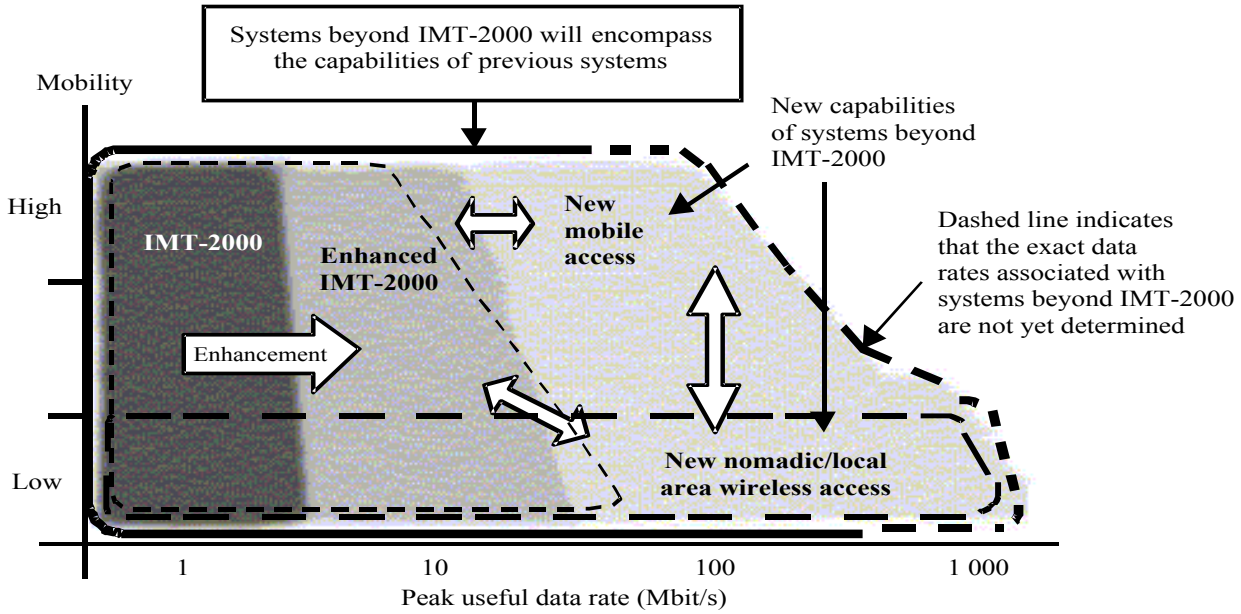
Multimedia: Various traffic characteristics and typically high bandwidth

IMT-Advanced Vision

- **Functional fusion** with high commonality and
- seamless interworking
- and interoperability

- Distinguish from the exis ting 3G in terms of **peak rate, aggregate throughput, greater flexibility**

Framework-Van Diagram



- Vision on Radio Access Technology level
  - Peak bit rates
    100 Mbps@high mobility (Mobile access)
    1 Gbps@low mobility (Nomadic access)
    - Higher transport data rates due to overhead (signaling, coding...)
  - Packet-based architectures – IP friendly
    Offering increased system security, reliability, intersystem mobility and interoperability capabilities

Glance: Technical Figures

IMT-Advanced

- **Peak bit rates**
  - 100 Mbps for Mobile access
  - 1 Gbps for Nomadic access
- **Ubiquitous data rates for Mobile Access** [2]
  - 50 Mbps @ 25-50MHz CBW at high mobility (Macro)
  - 100 Mbps @ up to 100MHz CBW at low mobility & without inter-cell interference (Micro)
- **Mobile Deployments**[2]
  - Macro-cell with 150km/h Micro-cell with 50km/h
  - Under 6 GHz frequency
- **Multiple radio interfaces** [3]
  - Seamless H/O with other radio interfaces

802.16 NOW..

- **Peak bit rates (SISO)**
  - 31.68 Mbps (DL) @ 10MHz with 64 QAM
- **Average Rates** (DL:UL)=(28:9)
  - 8.8/1.38 Mbps (DL/UL) @ 10MHz, SIMO
  - 13.60/1.83Mbps (DL/UL) @ 10MHz, MIMO
- **Mobile Deployments**
  - Up to 60km/h – in reality, up to xx.
  - Distinguish services for different channel environment
- **Packet based & IP-friendly**
  - Suitable to IP services
  - Simplified N/W Architecture

802.16 in the IMT-Advanced

802.16e-2005 Framework

- **Scalability in Bandwidth**
  - Supports various bandwidths with single standard
- **High flexibility**
  - Differentiated service classes
  - Flexible resource allocation
- **Packet-based Architecture**
  - IP-friendly

Provides

- **Variety in applications**
  - **Bandwidth**
  - **User environment**
- **Wide ranges of services in terms of data rates and QoS**
- **Interworking/ Interoperability**

- **Peak rate Less than IMT-Advanced vision**
- **Rather less spectral efficiency**

To be improved

By 802.16m standardization with technologies e.g.,

- **Wider bandwidth**
- **MIMO-optimized**
- **Reduced overhead, etc**

Remarks

- Further improvement of current 802.16 should provide
  - higher efficiency in use of radio resources, and
  - higher peak/average data rates per user.

- However, 802.16 still provides the framework of radio interface capable of
  - Best fitting to deployment scenarios,
  - Providing diverse services and user environments, and
  - IP-centric/friendly service provisioning.

- 802.16 Evolution with backward compatibility is a baseline for the future IMT-Advanced Standards.

IEEE 802 Tutorial:

IEEE 802.16 and IMT-Advanced

Overview of the draft 802.16m PAR

Roger Marks
NextWave Broadband, Inc.
Chair, IEEE 802.16 Working Group

Overview of draft 802.16m PAR

Key documents:

[Draft] P802.16m Project Authorization Request: Advanced IEEE 802.16 Air Interface

IEEE 802.16-06/054:
http://ieee802.org/16/docs/06/80216-06_054.pdf

[Draft] Five Criteria Statement for P802.16m PAR Proposal

IEEE 802.16-06/055:
http://ieee802.org/16/docs/06/80216-06_055.pdf

Draft 802.16m PAR: Scope

This amendment provides an advanced air interface to meet the requirements of next generation mobile networks. This standard is intended for incorporation into the IMT-Advanced standardization activity being conducted by the International Telecommunications Union – Radiocommunications Sector (ITU-R). The amendment is based on the WirelessMAN-OFDMA specification and provides continuing support for legacy subscriber stations.

Draft 802.16m PAR: Key Elements

Purpose: *The purpose of this standard is to update the WirelessMAN-OFDMA air interface in accordance with the requirements defined for the internationally agreed radio interface standards for next generation mobile networks such as IMT-Advanced.*

Need: The International Telecommunications Union – Radiocommunications Sector (ITU-R), is preparing to develop the IMT-Advanced radio interface standards to provide advanced air interface specifications for mobile telecommunications. Under the current schedule, initial proposals for IMT-Advanced are anticipated to be solicited for mid-2008, and standardization is expected to continue through 2009. This project will seek to develop an advanced IEEE 802.16 air interface by working cooperatively with ITU-R and its members.

Expected Sponsor Ballot Date: *2009-03*
Projected Completion Date: *2009-11*

IEEE 802 Tutorial:

IEEE 802.16 and IMT-Advanced

Panel Discussion:
Operator View