

CANADIAN EVALUATION GROUP



IMT-2020 Workshop
Munich, Germany
4th October 2017

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Overview

Structure, organisation, future plans

- Organisation
- History
- Evaluation approach
- Questions

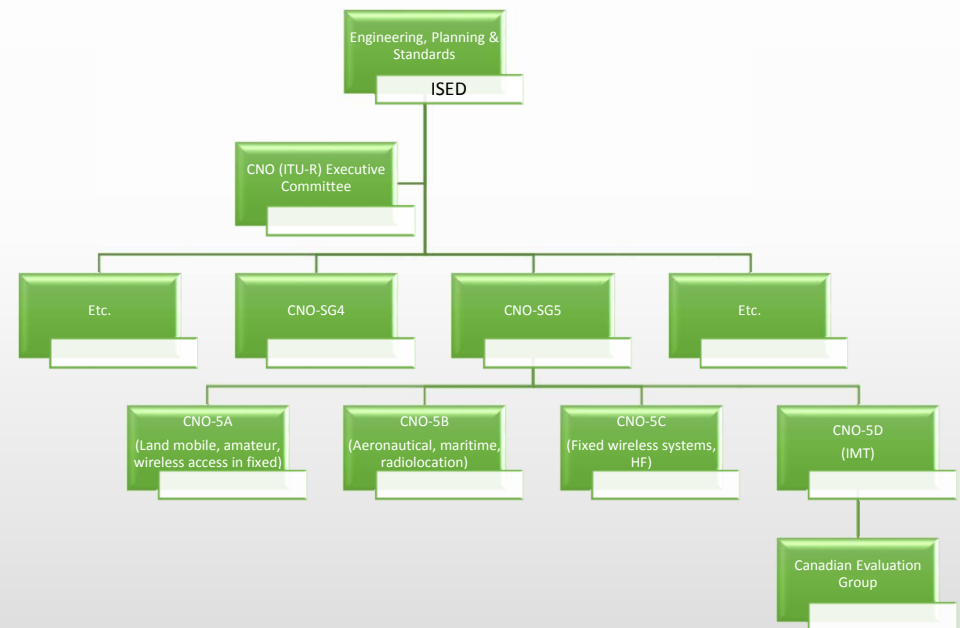
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CEG – Organisation

(CNO process)

- The Canadian Evaluation Group was started in 1996
 - Under the auspices of the Canadian National Organisation
- “Reports” to CNO-5D (in a manner of speaking); follows the CNO methods of working
- CEG has worked on the evaluation of both IMT-2000 and IMT-Advanced candidate submissions



CEG – History (1)

IMT-2000 (part 1)

- IMT-2000 (Period: 1st Jul – 30th Sept 1998)
 - Objective was to evaluate candidate Radio Transmission Technology (RTT) proposals i.e. verify each candidate submission met the requirements of an IMT-2000 radio interface
 - These requirements were established by the ITU-R in BR Circular Letter 8/LCCE/47 (<http://www.itu.int/itudoc/itu-r/archives/rsg/lcce/rsg8/37459.html>)
 - Total of 10 terrestrial and 5 satellite RTTs submitted; only the terrestrial candidates were evaluated
 - Procedure guided by Recommendation ITU-R M.1225
 - CEG evaluated only the most important criteria (priority 'G1'), and the attributes associated with each criterion
 - Each criterion assigned a co-ordinator (Ericsson, Bell, Nortel, Microcell, Clearnet and Cantel)
 - Each co-ordinator performed an **analysis** of the criterion across the candidate RTTs ("horizontal" eval.)

First WS on RTT proponents held in Toronto, Canada, 1996



CEG – History (2)

IMT-2000 (part 2)

- 2007: Carried out evaluation of IP-OFDMA (terrestrial RTT) to qualify as 'IMT-2000'
 - Period (roughly): Jan-May 2007
 - Procedure very similar to 1996
 - Co-ordinators were Ericsson, Bell, Nortel, RIM, Telus, Rogers (Motorola & Wavesat as alternates)
 - Again, each co-ordinator performed an **analysis** of the criterion assigned
- RESULTS OVERALL: As of Jan 2009, IMT-2000 had 6 terrestrial RTTs
- Detailed radio specifications are contained in Recommendation [ITU-R M.1457](#)
- Updates of this Recommendation take place every other year in close collaboration with the concerned SDOs



CEG – History (3)

IMT-Advanced (part 1)

- IMT-Advanced (Sept 2009 – June 2010)
 - Objective: evaluate candidate Radio Interface Technology (RIT) proposals i.e. verify each candidate submission met the requirements of an IMT-Advanced radio interface
 - Well-established procedure with
 - Work guided by Resolution [ITU-R 57](#)
 - Detailed [process](#) and [schedule](#)
 - Requirements, evaluation criteria and submission templates in Report [ITU-R M.2133](#)
 - Key Technical Performance Requirements in Report [ITU-R M.2134](#)
 - Guidelines for the evaluation of the RITs in Report [ITU-R M.2135](#)
- Evaluation accomplished through:
 - Inspection
 - Analysis
 - Simulation (simulator established with the help of academic participation)



CEG – History (4)

IMT-Advanced (part 2)

- 15 organisations took part; 2 additionally as observers (IC, CRTC)
 - “Matrix of responsibilities”: Divided the task of evaluation of each of the 13 key technical parameters amongst the members
- RITs received from 3GPP ([IMT-ADV/8](#)) and IEEE ([IMT-ADV/4](#)) (with slight ‘variants’ from some SDOs); both passed the evaluation process
- CEG Report issued as [IMT-ADV/12](#)
Detailed radio specifications are contained in Recommendation [ITU-R M.2012](#)
- Updates of this Recommendation take place every other year in close co-operation with the concerned SDOs





Technical parameters evaluated

IMT-2000

Number	Criteria	Most Important Technical Attributes (G1)
A3.1	Spectrum efficiency	1. Voice traffic capacity (E/MHz/cell) 2. Information capacity (Mbit/s/MHz/cell)
A3.2	Technology complexity – Effect on cost of installation and operation	1. Peak transmitter/carrier (Pb) power 2. Broadband power amplifier (PA) 3. Number of users per RF carrier/frequency channel 4. Base site implementation/installation requirements 5. Handover complexity
A3.3	Quality	1. Maximum user bit rate for data (bit/s) 2. Voice quality
A3.4	Flexibility of radio technologies	1. Multimedia capabilities 2. Flexibility in the use of the frequency band 3. Minimum frequency band required to operate 4. Frequency management between different layers 5. Existing system migration capability
A3.5	Implication on network interfaces	1. Examine the network modifications required for the RTT to pass the standard set of ISDN bearer services
A3.6	Handportable performance optimization capability	1. Peak transmission power 2. Diversity schemes 3. The number of antennas 4. The number of receivers 5. The ratio of “off(sleep)” time to “on” time 6. Digital signal processing requirements
A3.7	Coverage/power efficiency	1. Base site coverage efficiency 2. Method to increase the coverage efficiency

Additional Attribute used by the CEG

A3.4.2.1.4 (New attribute)	Band plans and frequency duplexing The proponent should describe how their system will provide global service delivery in the different regional/national band plans and frequency duplexing arrangements for IMT2000 systems.	Q and q	G1	A1.2.1 A1.2.2 A1.2.2.1 A1.2.4
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Not evaluated by the CEG in 1999
But evaluated in 2007

Data rates:
2 Mbits/s in stationary environment
384 kbits/s in low-speed environment (50 kmph)?
144 kbits/s in high-speed environment (120 kmph)?



Technical parameters evaluated

IMT-Advanced

Institution	Chart summarizing the commitment of CEG participants in the evaluation activity														
	Peak Spectral Efficiency	Control Plane Latency	User Plane Latency	Handover			Bandwidth	Deployment in one identified IMT band	Channel bw scalability	Support wide range of services	Cell spectral efficiency	Cell-edge spectral efficiency	Mobility	VoIP capacity	Link budgets
				Intra-freq HO interruption time	Inter-freq HO interruption time	Inter-system									
	Analysis	Analysis	Analysis	Analysis			Inspection	Inspection	Inspection	Inspection	Simulation	Simulation	Simulation	Simulation	Verification
Bell	3GPP	3GPP	3GPP	3GPP	3GPP	3GPP	3GPP	3GPP	3GPP	3GPP					3GPP
Ericsson (CAN)	3GPP	3GPP	3GPP	3GPP	3GPP	3GPP	3GPP	3GPP	3GPP	3GPP	3GPP	3GPP	3GPP	3GPP	3GPP
Aviat Networks															IEEE
Huawei (CAN)	3GPP; IEEE	3GPP; IEEE	3GPP; IEEE	3GPP; IEEE	3GPP; IEEE	3GPP; IEEE	3GPP; IEEE	3GPP; IEEE	3GPP; IEEE	3GPP; IEEE	3GPP	3GPP	3GPP	3GPP	3GPP; IEEE
Intel (CAN)	IEEE	IEEE	IEEE	IEEE	IEEE	IEEE	IEEE	IEEE	IEEE	IEEE	IEEE	IEEE	IEEE	IEEE	IEEE
RIM	3GPP; IEEE	3GPP; IEEE	3GPP; IEEE	3GPP; IEEE	3GPP; IEEE	3GPP; IEEE	3GPP; IEEE	3GPP; IEEE	3GPP; IEEE	3GPP; IEEE	3GPP	3GPP	3GPP		3GPP
Rogers	3GPP; IEEE	3GPP; IEEE	3GPP; IEEE	3GPP; IEEE	3GPP; IEEE	3GPP; IEEE	3GPP; IEEE	3GPP; IEEE	3GPP; IEEE	3GPP; IEEE					3GPP; IEEE
Telesat															
Telus	3GPP	3GPP	3GPP	3GPP	3GPP	3GPP	3GPP	3GPP	3GPP	3GPP					3GPP
Carleton															3GPP; IEEE
INRS	3GPP; IEEE	3GPP; IEEE	3GPP; IEEE	3GPP; IEEE	3GPP; IEEE	3GPP; IEEE	3GPP; IEEE	3GPP; IEEE	3GPP; IEEE	3GPP; IEEE	3GPP; IEEE	3GPP; IEEE	3GPP; IEEE	3GPP; IEEE	3GPP; IEEE
Memorial	IEEE										3GPP; IEEE	3GPP; IEEE	3GPP; IEEE		3GPP; IEEE
Univ. Laval															
Ottawa U.															
U-of-Tor	3GPP; IEEE	3GPP	3GPP	3GPP	3GPP	3GPP	3GPP	3GPP	3GPP	3GPP	3GPP	3GPP			
Waterloo															
CRTC															
IC															
CRC	3GPP; IEEE	3GPP; IEEE	3GPP; IEEE	3GPP; IEEE	3GPP; IEEE	3GPP; IEEE	3GPP; IEEE	3GPP; IEEE	3GPP; IEEE	3GPP; IEEE	3GPP; IEEE	3GPP; IEEE			3GPP; IEEE
Section Coordinator	Andy M.	Remi C.	Remi C.	Andy M.	Andy M.	Andy M.	P.F. Ng	P.F. Ng	P.F. Ng	Jose C.	Sofiene (3GPP) Remi (IEEE)	Sofiene (3GPP) Remi (IEEE)	Sofiene (3GPP) Remi (IEEE)	Sofiene (3GPP) Remi (IEEE)	Ivo (3GPP) Vishnu (IEEE)
Target Compl	Mar/2010	Mar/2010	Mar/2010	Mar/2010	Mar/2010	Mar/2010	Mar/2010	Mar/2010	Mar/2010	Mar/2010	May/2010	May/2010	May/2010	May/2010	Feb/2010

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CEG – evaluation approach

- Similar to what we've done on the previous two occasions:
 - Guided by Resolution [ITU-R 65](#)
 - Following the detailed [process](#) and [schedule](#)
 - Requirements, evaluation criteria and submission templates in Report ITU-R M.xxxx
- Key Technical Performance Requirements in Report ITU-R M.yyyy
 - Guidelines for the evaluation of the RITs in Report ITU-R M.zzzz
- Co-ordinators will perform the necessary
 - Inspection, Analysis, Simulation (link- & system-levels, as per §7.1 of IMT.EVAL)
- Industry and academia will participate

NOTE: Reports complete, to receive nos. at SG5 meeting in Nov'17



Technical parameters to evaluate

IMT-2020

	Link Budget	Peak data rate	Peak spectral efficiency	User experienced data rate	5% user spectral efficiency per test env	Avg spectral efficiency per test env	Area traffic capacity (In-H, eMBB)	Latency		Connection density	Energy efficiency On load No load	Reliability	Mobility InH DU RU	Mobility interruption time	Bandwidth
								User plane	Control plane						
	Verification	Analytical	Analytical	Analytical (single band & layer); Simulation (multi-layer)	Simulation	Simulation	Analytical	Analytical		Simulation	Inspection	Simulation	Simulation	Analytical	Inspection
Ericsson															
Bell															
Rogers															
Telus															
Interdigital															
Etc.															

Noted that, for each test environment (5 in all), there may be up to 3 configurations to evaluate



Service parameters to evaluate

IMT-2020

	Support of wide range of services	Supported spectrum band(s) range(s)
	Inspection	Inspection
Ericsson		
Bell		
Rogers		
Telus		
Interdigital		
Etc.		