WINNER+ plans as IMT-Advanced evaluation group

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http://projects.celtic-initiative.org/winner+/WINNER+ Evaluation Group.html

References

- For structure, partner list, background and history see the WINNER+ presentation from ITU-R IMT-Advanced Workshop #3:

http://groups.itu.int/Default.aspx?tabid=721&DMXModule=1154&EntryId=186&Command=Core_Download

- WINNER+ evaluation home page:

http://projects.celtic-initiative.org/winner+/WINNER+%20Evaluation%20Group.html

- WINNER+ calibration document (living document):

http://projects.celtic-initiative.org/winner+/WINNER+%20and%20ITU-R%20EG%20documents/Calibration%20for%20IMT-Advanced%20Evaluations.pdf

WINNER+ ways of working

- WINNER+ is driven in project form spanning over many organisations
- Task/activity leaders plan and coordinate the work and together with members define, assign, and follow up action points towards goals
- Thus, partner contributions usually come in as part of a common overall plan
- The work is continously ongoing using telephone conferences and online filesharing as main tools as well as occasional physical meetings

WINNER+ evaluation plans for the 3GPP proposal

- Full evaluation of 3GPP LTE-based proposal
  - Both TDD and FDD components
  - ITU-R assumptions
  - ITU-R compliance templates and link budgets filled in
  - Guidelines on ITU-R IMT-Advanced web page taken into account
  - 3GPP proposed configurations

High level approach

- Analysis of proposal(s)
- Analytical and inspection evaluation
- Calibration of environment simulations within WINNER+
- Performance calibration within WINNER+ using material provided by proponents, e.g. for 3GPP LTE Rel 8.
- Choice of subset of 3GPP antenna configuration to study
- Simulation of chosen technologies and configurations
- Write evaluation report

Current status in WINNER+

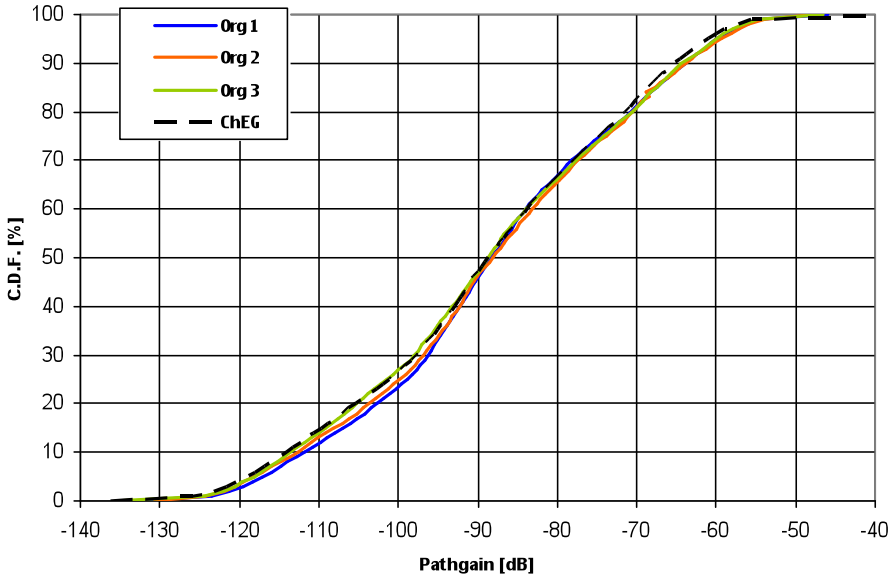
- Environment calibration well underway
  - Large-scale metrics more or less ready
    - Comparison with Chinese EG done with good results
  - Small-scale metrics has good progress
    - Good alignment between the first partners
    - We await results from more partners
- Assumptions for LTE Release 8 basic performance calibration have been decided
- Discussions started on configurations for ”LTE Release 10 and beyond”
  - Issues to discuss include: scheduler, chosen antenna configurations, link adaptation

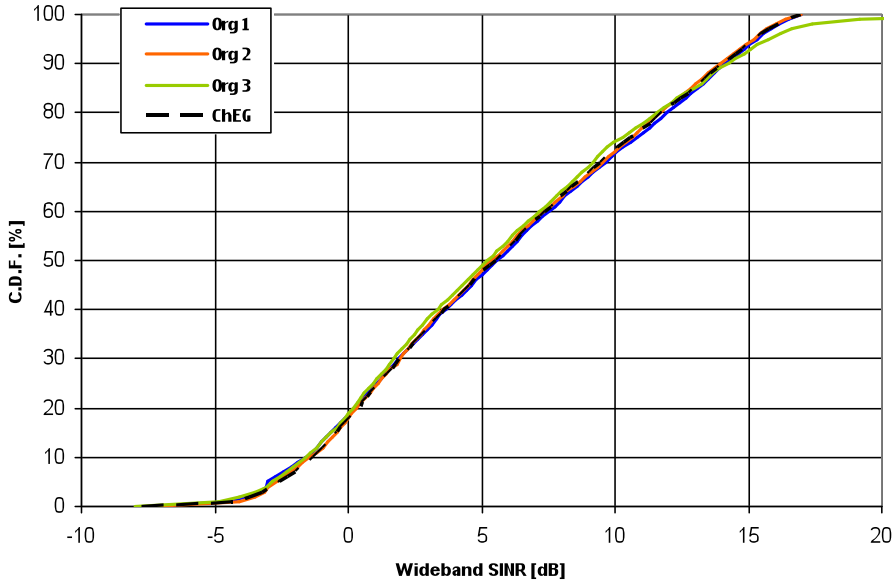
Calibration of large scale metrics

- Pathloss (to serving cell) and wideband SINR (”geometry”) from a number of WINNER+ organizations

- In addition, results from the Chinese evaluation group are inserted for comparison
  - (People’s Republic of) China ”Proposal on Evaluation Calibration among Evaluation Groups”, input #486 to the 5th ITU-R WP5D meeting in Geneva, Switzerland, June 2009

Example: Calibration Results for Urban Micro



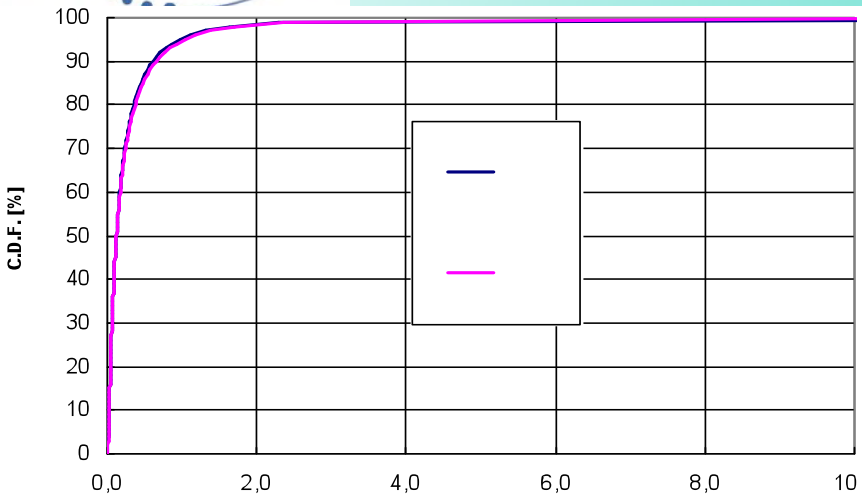


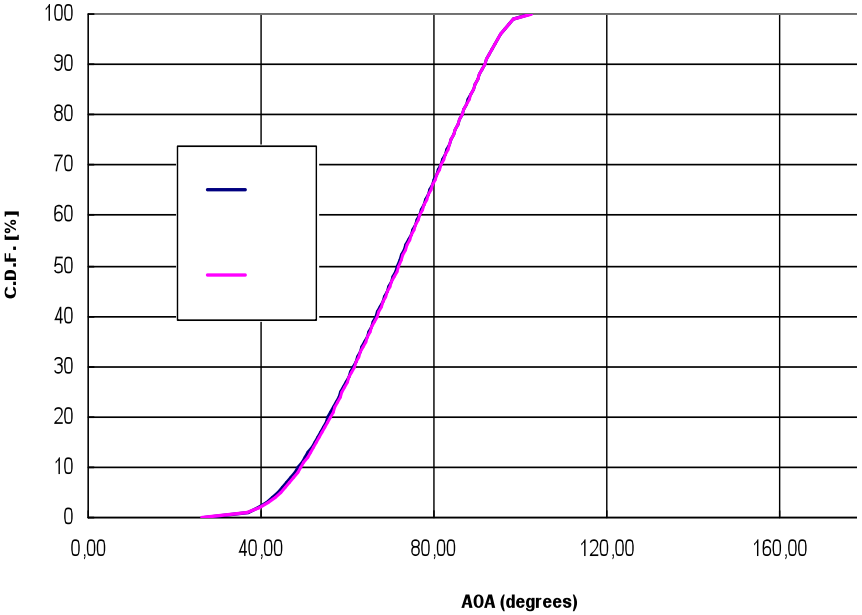
- Overall very good alignment across the different organizations and with China EG

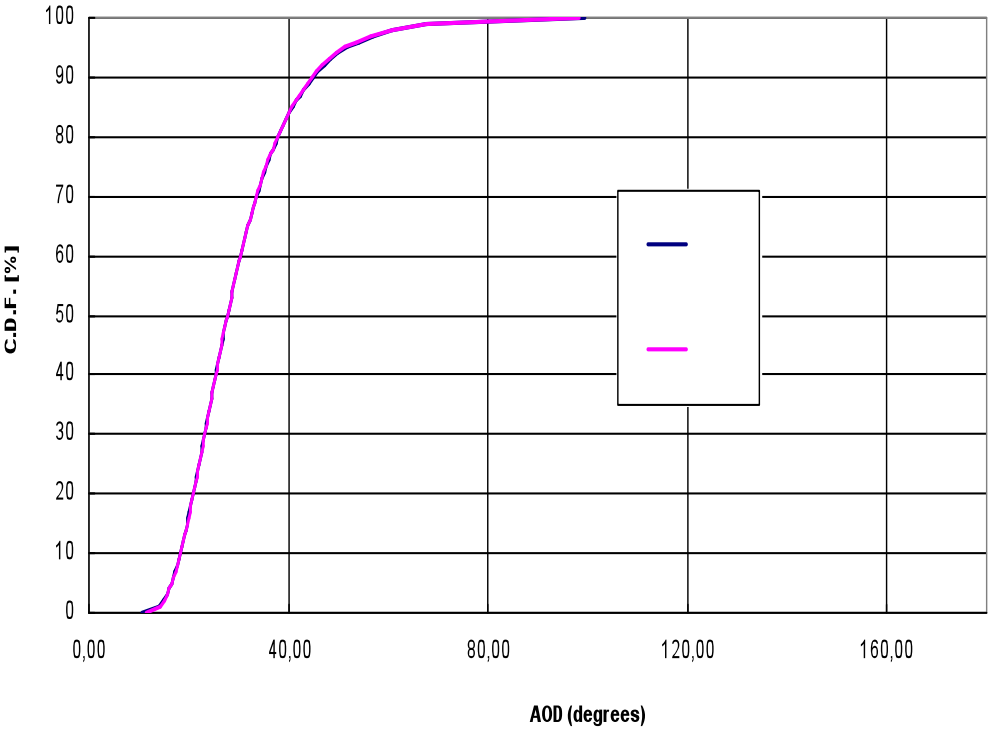
Calibration of small scale metrics

- Method: comparison of the distributions of delay spread and the angular spread at the base station and at the user terminal.
- The small-scale fading calibration is performed using omni-directional antennas at both the base station and the user terminal.
- The calibrations are performed separately for LoS and NLoS conditions.
  - In addition, outdoor-to-indoor propagation is relevant in the UMi scenario.

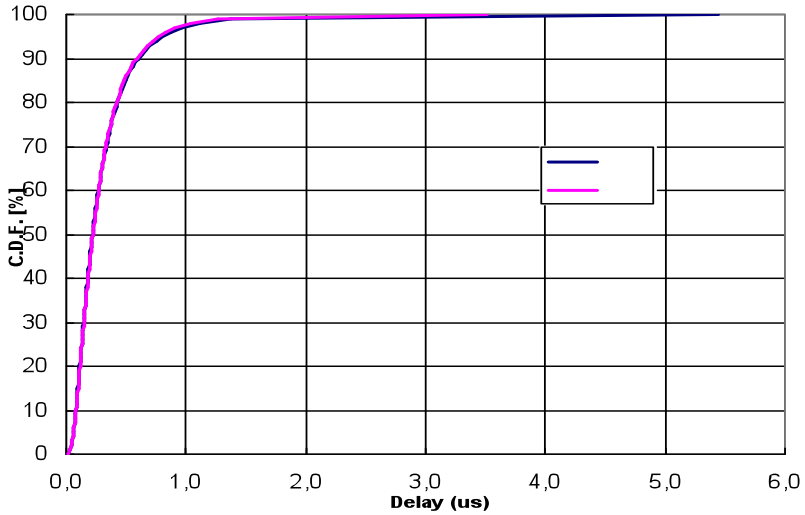
Example: Urban Micro NLOS

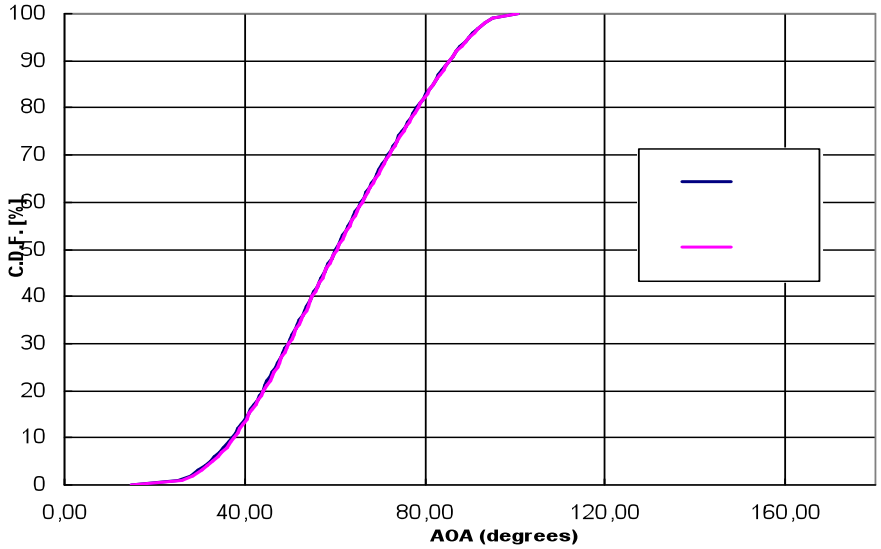


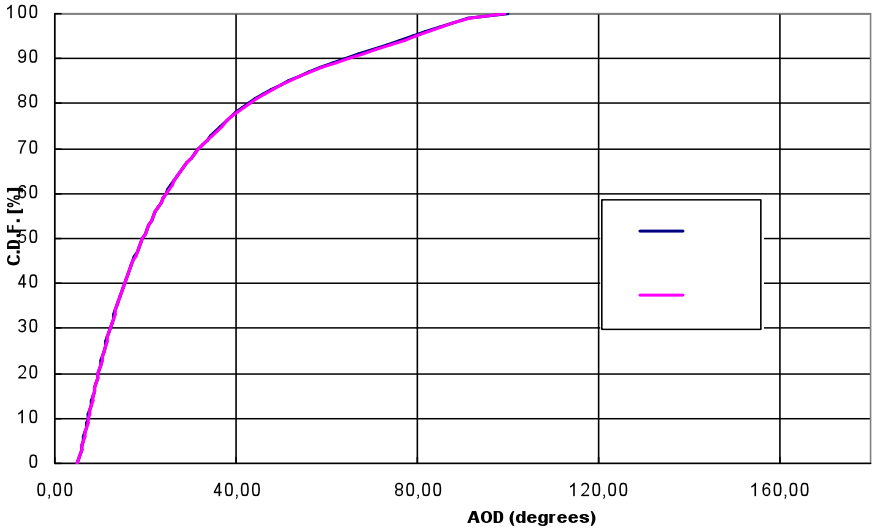




Example: Urban Micro Outdoor-to-Indoor







Small scale metric calibration results

- WINNER+ is awaiting more results from other partners
- Good alignment in LoS, NLoS and Indoor-to-outdoor cases for first partners

Assumptions for LTE Rel 8 performance calibration

LTE Rel-8 parameters

- One step in the calibration work is to evaluate LTE Rel-8 under 'simple' but common assumptions
- The focus is not on optimizing performance but on the calibration of the simulation tools
- 3GPP defined a reference LTE Rel-8 setup during the LTE-Advanced evaluation work
  - Beneficial to use the same parameters (if possible)
  - The reference evaluation assumptions (and the results thereof) are expected to be published in 3GPP TR 36.814 http://www.3gpp.org/ftp/Specs/html-info/36814.htm

Proposal: Parameters for LTE Rel-8

Parameter	Value
General	Parameters and assumptions not explicitly stated here according to ITU guidelines M.2135 and 3GPP specifications
Duplex method	FDD
Network synchronization	Synchronized
Handover margin	1dB
Downlink transmission scheme	1x2 SIMO
Downlink scheduler	Round robin with full bandwidth allocation
Downlink link adaptation	Wideband CQI, no PMI on PUCCH (mode 1-0) 5ms periodicity, 6ms delay total (measurement in subframe n is used in subframe n+6) CQI measurement error: None MCSs based on LTE transport formats [5]
Downlink HARQ	Maximum four transmissions
Downlink receiver type	MRC
Uplink transmission scheme	1x2 SIMO
Uplink scheduler	Frequency Domain Multiplexing – non-channel dependent, share available bandwidth between users connected to the cell, all users get resources in every uplink subframe. With M users and Nrb PRBs available, Mh=mod(Nrb,M) users get floor(Nrb/M)+1 PRBs whereas Ml=M-Mh users get floor(Nrb/M) PRBs

[5] 3GPP TS 36.213: "Evolved Universal Terrestrial Radio Access (E-UTRA); Physical layer procedures (Release 8)"

Proposal: Parameters for LTE Rel-8

Uplink Power control	P0 = -106dBm, alpha = 1.0
Uplink Link adaptation	Based on delayed measurements. Ideal channel estimate from UL transmission in subframe n can be used for rate adaptation in subframe n+7 MCSs based on LTE transport formats [5]
Uplink HARQ	Maximum four transmissions Proponent to specify IR or CC
Uplink receiver type	MMSE in frequency domain, MRC over antennas (no intercell interference rejection)
Antenna configuration	Vertically polarized antennas 0.5 wavelength separation at UE, 10 wavelength separation at basestation
Channel estimation	Ideal, both demodulation and sounding
Control Channel overhead, Acknowledgements etc.	LTE: L=3 symbols for DL CCHs, M=4 resource blocks for UL CCH, overhead for demodulation reference signals,
BS antenna downtilt	ITU Indoor, indoor hotspot scenario (InH): N/A ITU Microcellular, urban micro-cell scenario (Umi): 12deg ITU Base coverage urban, Urban macro-cell scenario (Uma): 12deg ITU High speed, Rural macro-cell scenario (Rma): 6 deg Case 1 3GPP 3D: 15 deg Case 1 3GPP 2D: N/A
Feeder loss	0dB, except for the ITU scenarios in step 1a where a feeder loss of 2dB is used.
Channel model	According to ITU for ITU scenarios SCM urban macro high spread for 3GPP case 1
Intercell interference modeling	Explicit

[5] 3GPP TS 36.213: “Evolved Universal Terrestrial Radio Access (E-UTRA); Physical layer procedures (Release 8)”

Calibration metrics

- Average SINR (per UE) distribution [dB]
- Normalized user throughput distribution [bps/Hz]
- The resulting statistics will be used for comparison and calibration between WINNER+ partners only, and will not be intended as a true measure of LTE Rel 8 performance.

Thank you!