Proposed revision to Hierarchical Network Study Report

IEEE 802.16 Presentation Submission Template (Rev. 9.2)

Document Number:

IEEE C80216ppc-11/0014

Date Submitted:

2011-11-04

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Re:

IEEE 802.16ppc-11/0005r1 and IEEE L802.16-11/0058r1

Base Contribution:

None

Purpose:

For discussion in Project Planning Committee

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Abstract

- Summary of discussion in #75
- Discussions in WiMAX Forum
- Proposals
  - Proposed revision to Hierarchical Network Study Report
  - Proposed work plan for a contribution toward ITU-R Cognitive Report
- Conclusions

Summary of discussions in #75

- Operators' Motivation
  - UQ/KDDI are interested in heterogeneous network deployment (LTE, WiMAX and Wi-Fi) to accommodate exponential growth of user traffic
- Follow-up of ITU-R Cognitive Radio Tutorial
  - Are the multi-RAT, multi-mode scenarios which operators expect covered in the 802.16 PPC's Hierarchical Network Study Report?
  - Is it useful to prepare inputs for the ITU-R based on the Study Report?
- Possible Way Forward
  - To clarify the issues and what we should do in the WG to meet operators' need for heterogeneous network
  - To consider contributing to ITU-R WP 5A so that the expected scenario is captured in the Report ITU-R M.[LMS.CRS2]

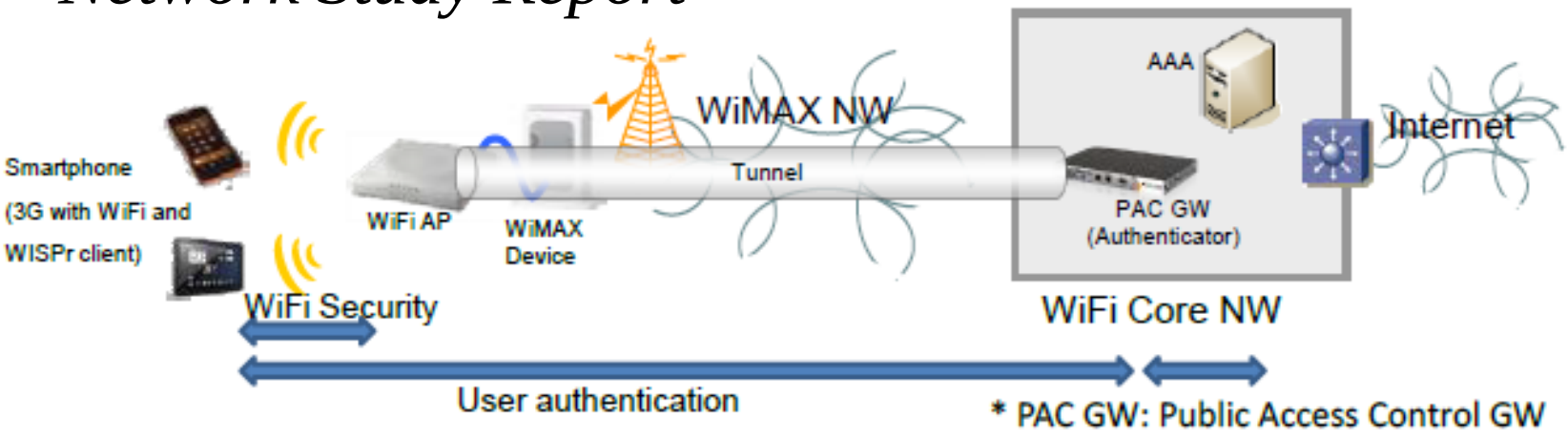
Discussions in WiMAX Forum

- Most popular topics of potential study items in TWG
  - Heterogeneous Networks (HetNet) for Single-RAT
    - 16e carrier aggregation, etc.
  - HetNet for Multi-RAT
    - WiFi Offload
      - WiFi Offload is the most popular approach to alleviate upcoming spectrum shortage, for example: CMCC deploy 1,000,000 WiFi Hotspots to supplement their data network
    - **Including 3G as a scope is still under discussion**
- Study results "WiMAX Forum Network Architecture" in NWG
  - Interworking Specification
    WiMAX – Pre-Release 8 3GPP Interworking, *"WMF-T37-008-R016v01 (2010-11-30)"*
  - Architecture, Detailed Protocols and Procedures
    WiMAX - 3GPP EPS Interworking, *"WMF-T37-009-R016v01 (2010-11-30)"*

Most popular topics in TWG

- Wi-Fi Offload
  - aka Heterogeneous Networks with different RATs
  - Wide deployment of Wi-Fi, usually associated with the network of a cellular operator, to service dual mode WiMAX-Wi-Fi devices e.g. smartphones with the goal of offloading Internet data traffic from WiMAX RAN to Wi-Fi

=> *The topic had been already included in Hierarchical Network Study Report*

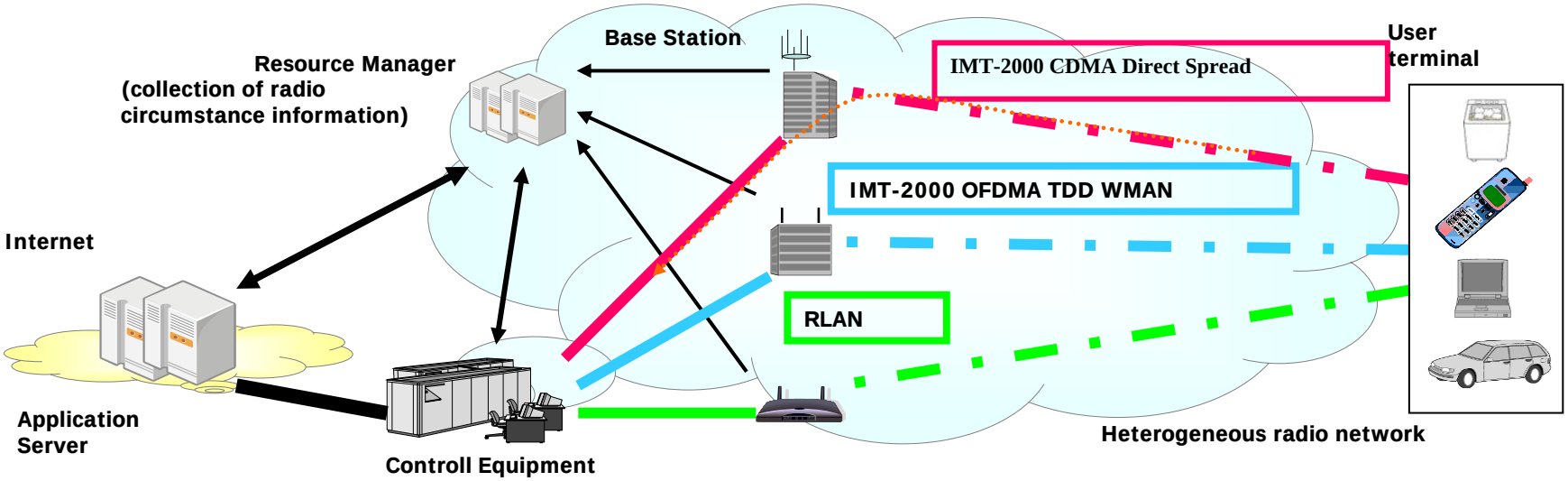


Ref: Potential Study Items in TWG, TWG Sep 2011 Meeting, Bangkok, Vladimir Yanover

Most popular topics in TWG

- Heterogeneous Networks (HetNets)
  - Same RAT, cells of different size, transmit power, normally deployed by a cellular operator to increase capacity with same set of frequency channels

=> *Multi-RAT scenario, especially 3GPP and WiMAX, is proposed to be added*



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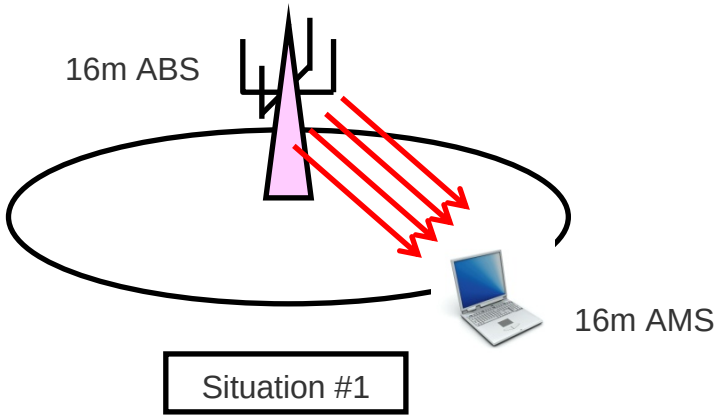
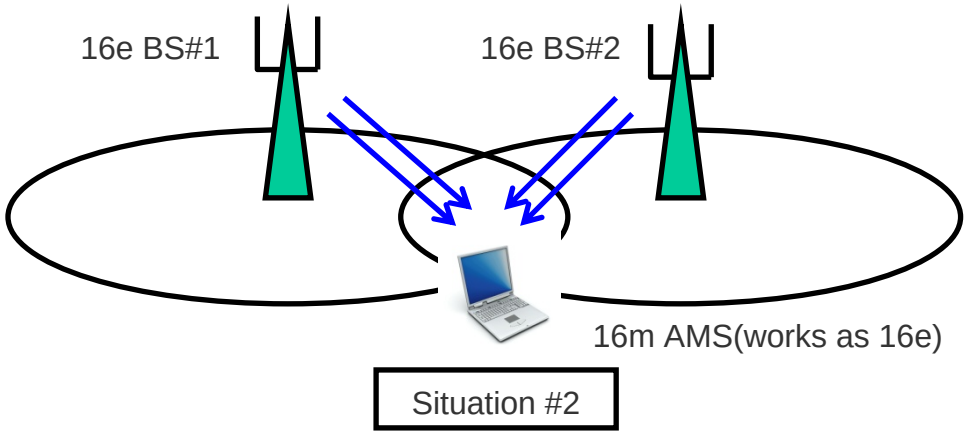
UQ proposal to TWG “16e carrier aggregation” (for information to IEEE 802.16WG)

- Objective

  To increase 16e peak throughput (~2x: as catalog spec) as follows;
  - Aggregation of BWs by two adjacent 16e BSs
  - Aggregation of BWs by different carriers of 16e BSs at the same site
- Minimum requirement
  - Without 16e/16m standard change
  - Needs S/W implementation of 16m terminal which has 4RX feature
- Technical feasibility
  - Usage of L3 aggregation scheme, such as Multi-streaming with SCTP





Proposed revision to Hierarchical Network Study Report (IEEE 802.16ppc-11/0004r1)

- *Add the texts as indicated*

1 Introduction

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The figure also shows multiple radio access technologies (RAT) being integrated and managed as part of a single hierarchical network (multi-radio network elements are indicated in “blue”:). Here the additional, spectrum and connectivity available across these different networks may be exploited synergistically to further improve system capacity and client quality of service. The cost associated with this additional capacity can be significantly lower as the alternate spectrum may be the essentially free unlicensed spectrum. For example, an operator can judiciously offload “best-effort” traffic to IEEE 802.11 hotspots in its network to add capacity at a much lower cost. Furthermore, Multi-RAT systems in licensed spectra may be utilized for the efficient use of them among those licensed bands. For example, an operator who has 3GPP radio interface network can offload its traffic to IEEE 802.16 network to utilize its total capacity efficiently. Also new network devices, such as the integrated IEEE 802.11/16 femto AP shown, can implement tighter coupling across these two radio technologies and efficiently utilize the spectrum available across both licensed and unlicensed bands.

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Proposed work plan for a contribution toward ITU-R Cognitive Report

- **Nov 2011**: Revise Hierarchical Network Study Report
- **Jan 2012**: Update the Study Report on cognitive radio aspects and discuss necessity of a contribution to ITU-R
- **Mar 2012**: Draft an ITU-R contribution in PPC by extracting CRS aspects from the Study Report
- **May 2012**: Finalize an ITU-R contribution in ITU-R Liaison Group and submit it to ITU-R
- **22 May– 1 Jun 2012**: Present an IEEE contribution at ITU-R WP 5A meeting

Conclusions

- This document proposes to revise Hierarchical Network Study Report
- Work plan is also proposed for further study to update the Study Report and to develop an ITU-R contribution towards ITU-R Cognitive Report