



WiMAX System-Level Evaluation Methodology Update

Raj Jain

Professor of Computer Science and Engineering
Washington University in Saint Louis

Jain@wustl.edu

<http://www.cse.wustl.edu/~jain>

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- Goal
- Link-Level vs System-Level Models
- Accomplishments and Open Issues:
 - PHY Models
 - MAC
 - Overall System Simulation Approach
- Cross-Team Relationship
- This is only an incremental update since San Diego Plenary. See AATG website for a detailed presentation on methodology (July 2006), http://www.wimaxforum.org/apps/org/workgroup/aatg/download.php/8087/wimax_sim.ppt

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Goal

- Standardized methodology for system level simulation of WiMAX systems
- Can be used by any modeling system: NS2, Opnet
- Can be used by Equipment vendors/service providers to model their system
- This methodology will be used for AATG NS2 simulation
- Similar documents exist for 3GPP/3GPP2

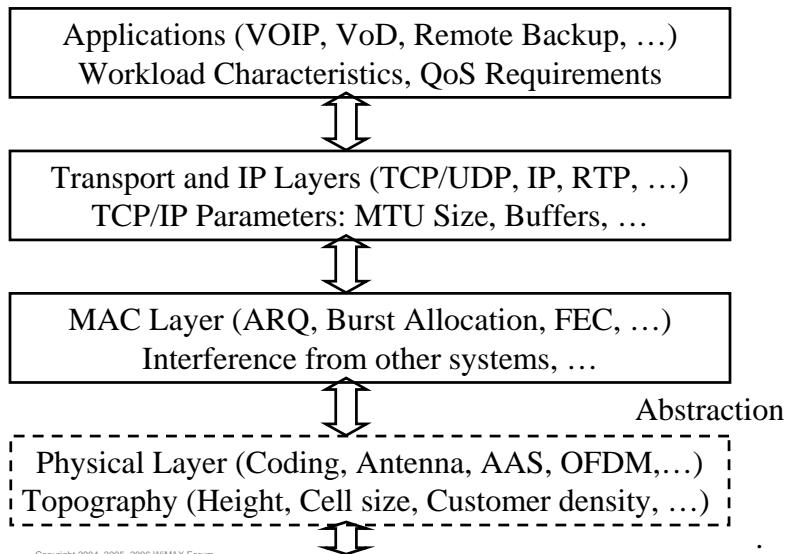
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WiMAX Model Components



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Link-Level vs System-Level Models

Link-Level:

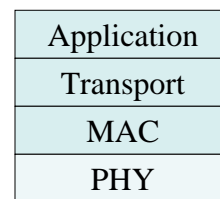
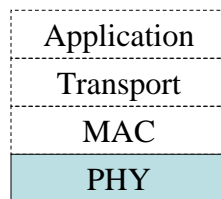
Goal: Study different signal transmission and reception schemes

Single Link
Single Cell
Single Base Station
Emphasis on PHY
Some MAC

System-Level:

Goals: Application Level Performance

Multiple users
Multi-Cells
Multiple Base Stations
Large # of subscribers
Emphasis on All Layers
=> PHY abstraction



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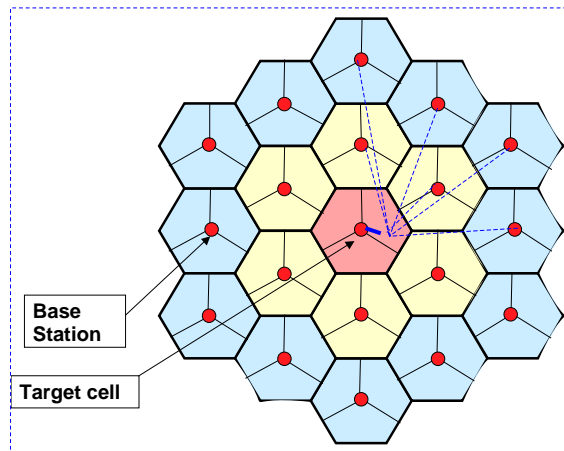
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System Simulation Approach



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[3GPP]

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System Simulation Approach

- Simulate multiple WiMAX cells
- Model different applications with different levels of penetration
- Simulate application traffic streams; use realistic traffic models
- Distribute user session randomly among the cells
- Utilize neighboring cell traffic to create interference in the center cell
- Abstract PHY to a table/graph mapping physical condition to Block Error Rate (BLER)
- Apply generic MAC scheduler and MAC layer interfacing with PHY abstraction
- No link level simulation

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Acknowledgement

Contributions from the following companies have been used:

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- Arraycom
- AT&T
- Intel
- Lucent
- Motorola
- Postdata
- Siemens
- Sprint
- Telsima
- Venturi Wireless

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Recent Reviewers and Contributors

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- Jongnam Yun/Postdata
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PHY Models

- Started with 3GPP and 3GPP2 concepts
- Changes to accommodate:
 - Broadband
 - SOFDMA
- Path Loss
- Established basic path loss formulas
 - Verify choice with MTG
- Resolved Error Probability Model
 - EESM/MIC/MIM
 - Established granularity: FEC block
- Open Issue:
 - Simplification of interference
 - Reconcile MWG system evaluation table parameters with our contribution

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MAC

- List of MAC features identified
 - Good momentum on channel coding, scheduler
 - Discuss overhead numbers (N1 to N9)
 - Need to write up the enhanced proportional fair scheduler
- Packet processing flows clarified – See next slide
- Open Issues:
 - Need contributions on MAC features

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MAC Layer Modelling

- **6.1 Convergence Sublayer**
- **6.2 MAC PDU FORMATS**
- **6.3 ARQ MECHANISMS**
- *6.4 MAC SUPPORT OF PHY LAYER*
- **6.5 DYNAMIC SERVICE FLOW OPERATION**
- **6.6 Scheduler**
 - 6.6.2 Scheduling Mechanisms
- **6.7 CHANNEL CODING**
- **6.8 HARQ**
- **6.9 MOBILITY MANAGEMENT (LATER RELEASE)**
- **6.10 POWER MANAGEMENT (SLEEP-IDLE MODE)**
- **6.11 SECURITY (LATER RELEASE)**
- **6.12 MBS (LATER RELEASE)**
- **6.13 UL/DL MAPS**
- **6.14 BUFFER MANAGEMENT**

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Overall System Simulation Approach

- 19 Cell Methodology
- Added traffic models
- Protocol Layer Modules
- NS2 program Modules
- Open Issues:
 - Write up user drop processing
 - Finalize user loading in neighbor cells
 - Settle on system simulation parameters

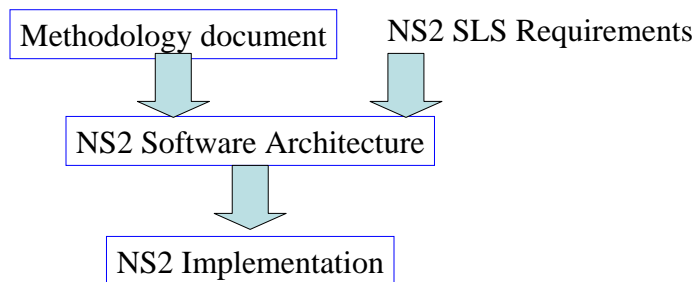
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