IEEE P802.20

Mobile Broadband Wireless Access

Project	IEEE P802.20 Working Group for Mobile Broadband Wireless Access (MBWA)	
Title	**802.20 Technical Requirements – Strawman Version 00**	
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Re:		
Abstract	This contribution is an attempt to establish a framework for and some initial technical requirements for 802.20 project. It continues the process initiated by C802.20-03-025r1 as presented at the March Meeting of 802.20	
Purpose	The intent of this contribution is to establish a working document that will become the repository for the terms, definitions and high level requirements to be used in the selection process for a Draft Standard for 802.20.	
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802.20 Technical Requirements A Second View (and "Strawman" Document)

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Recommendations – From C802.20-03/025

- Moving Forward from the PAR and 5C
  - 802.20 Should Develop a Consensus View in Many Areas Not Just MAC and PHY
  - 802.20 Would Do Well to Develop a High Level Requirements Document
  - 802.20 Should Develop Appropriate PHY and MAC Modeling Techniques
    - Not Just Data Link and PHY Layer
    - Need System Level Model to See Potentially Hidden Effects
    - Aids in Building Confidence that 802.20 Has Standardized the Best Technical Solution
  - Technical Evaluation Process Has Not Been Addressed and Should Be Before We Discuss Specifics

Goals

- Strawman Definition of Technical Requirements for 802.20
  - Incomplete – Must Fill In with Group Consensus
  - Based on PAR Analysis and Other Technical Requirements Docs
    - Add Definitions and Terminology Section
    - Identify Major Requirements so Far
    - Fill-In Issues for Clarification
    - Identify Areas For Further Specification
- Outline a Document for Technical Requirements
  - Based on PAR Analysis
  - Based on 802.15 SG3a Process
    - Down Selection Process
    - Technical Requirements
    - PHY Selection Process
  - MAC Selection Process
    - Not in SG3a Efforts, but Needed in 802.20

Technical Requirements - Approach

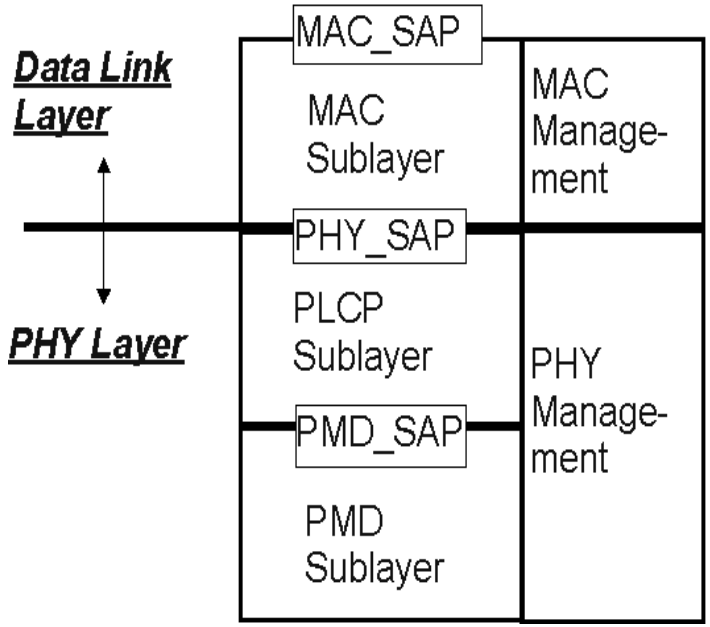
- Base the Document on 802.15 SG3a (or TG3a) Work
  - SG3a is Early Work is Often Cited as a "Model" for 802 Standards Requirements Development
- Add Items Not Covered in That (PHY-Only) Project
- Adopt a "Layered" Approach to Requirements
- DO NOT try to Fill In Consensus Items Too Much!!
  - Goal is not one Person/Company Opinion, but a Consensus Document
  - This Technical Work must be Developed and Agreed by 802.20
  - Several "Commentary" Items and Examples Included
- Capture Major Section Concepts in One Place
  - Generally Based on Concepts Discussed in 802.20
  - Open to Additions as Necessary

Strawman Document Sections

- Introduction and Layered Model
  - Based on 802 specification models
- Applications and Traffic Types for MBWA
  - Meant to capture Application Specifics and to Abstract Traffic Types/Models for Them
- System Requirements for MBWA
  - User Visible Requirements
  - System Behavior Requirements
- MAC Requirements
  - New Section (No SG3a Model)
- Physical Layer Requirements
  - Much is Borrowed from SG3a
- Coexistence Requirements
  - Coexistence Scenario Development
  - Requirements for Co-existence with Incumbent Licensed Services

Introduction and Layered Model

- Brief Introduction of What We're Trying to Accomplish
- TBD – A System Reference Model
- Abstract Model for Specification
  - Needed, Regardless of Implementation
  - Based on 802.15TG3a Model
- Data Link Layer
  - MAC Sublayer
  - MAC Management Sublayer
- PHY Layer
  - PLCP Sublayer
    - Convergence Protocol Sublayer
  - PMD Sublayer
    - Physical Media Dependent Sublayer
  - PHY Management



MAC_SAP: MAC Service Access Point
PHY_SAP: PHY Service Access Point
PLCP: PHY Layer Convergence Protocol, contains FEC
PMD: Physical Medium Dependent (radio)

Applications and Traffic Types

- Sections for “Telecom” to “DataCom” Applications
- Current Subsections
  - **Data Communications Applications**
    - Web Browsing, E-Mail, Instant Messaging as Examples
  - **Telecommunications Applications**
    - Voice Services (Possibly Carried as VOIP)
    - Supplementary Services
      - (Needed to Offer Service “Parity” with Current Cellular/PCS Services)
      - Examples include Forwarding, Calling Number Presentation, etc…
  - **Multimedia Applications**
    - These Include Traffic Mixes of Voice/Audio, Video, Interactive Materials, etc…
    - Several Standards In This Area (H-Series)
  - **Telematics Applications**
    - 802 Technology Apps to Vehicular Applications – An Emerging Area
  - **E911 Services**
    - Required in Licensed Bands
    - Two Parts: Priority Access and
  - **Messaging Services**
    - Very Popular 3G Services (And Very Optimized)
  - **3G Service Extensions Over MBWA**
    - Will Likely Be Required by Service Providers

System Level Requirements

- User Visible Requirements
  - Numbers of Users >> Existing Systems
  - Data Rates >> Existing Systems
    - Data Rate Requirements – Peak, Average
- Signaling Requirements
    - **So Far, Largely Ignored, but Important for a Commercial System**
    - **Subchannel Requirements (Subchannels, Data Rates, Signaling Reliability)**
- Network Security Requirements
  - Access Control, Privacy Requirements
  - Billing and Authorization Requirements
- Handoff Methods for MBWA
  - Soft Handoff
  - Hard Handoff Types
  - IP-Layer Handoffs

Media Access Control Requirements

- **This is a New Section: Probably Needs Much More Definition**
- **Active and Dormant Stations**
  - This Has Been Mentioned
- **MAC Latency**
  - Important for Interactive and MM Services
- **MAC Latency Variation**
  - Also Important for Interactive and MM Services
- **MAC Frame RTT**
  - Lower Level Requirements on MAC Frames
- **Random Access Features and Requirements**
  - Possible to Include Random Access Channels
- **Polled Access Features and Requirements**
  - May be required for Certain Services
- **QoS and the MAC**
  - Important for MM and Modern Service Concepts
- **MAC Complexity**
  - Helps to Define Complexity Measures
- **Mobility Requirements on the MAC**
  - Attempt to Derive Mobility-Centric Requirements on the MAC Layer

Physical Layer Requirements

- **Channelization and Spectral Masks**
  - Many Bands and Operation Types Need Definition
  - Regulatory Requirements Required
- **Spectral Efficiency**
  - PAR States that Spectral Efficiency >> Existing
  - Define How Measured, and “>>”
- **Data Rate Requirements**
  - Aggregate, Mobile Station Oriented
  - Peak, Achievable (real), Average Data Rates Defined
- **Channel Models**
  - SISO and MIMO Channel Models Included
- **Power Consumption**
  - Power Is Very Important for Mobile Stations
  - Definition of Power Consumption Values and Measurements Needed
- **PHY Complexity**
  - Complexity Should Have Well-Understood Measures Used
- **Mobility and the PHY**
  - Performance Requirements for the PHY to Meet PAR Goals of >>250 Km/Hr Robust Operation

Co-Existence and Interference Resistance

- Let's Not Do It as an Afterthought!!
  - Remember the "Alligator" Story!!
- Approach
  - Define Baseline Scenarios
  - Co-existence against the "obvious" services
  - Evaluate Projected Impacts of Traditional Technologies on MBWA and Vice Versa
  - Co-Channel Interference Models
  - Adjacent Channel Interference Models
  - Impacts of TDD in Traditionally FDD Bands
  - Let's Identify Issues and Solve Them Before we Create Them

Summary and Next Steps

- Skeleton Requirements Document Presented
  - Certainly a “First Draft”
  - Layered Approach, Modeled on 802.15 SG3a Work in Progress
  - Defines “Edge” Requirements as well as “Core” Requirements
- Recommend Using C802.20-03/44 as a Framework for Developing Technical Requirements for MBWA
  - Open to Additions, Modifications from 802.20
  - Needs to be Filled in with Collective View of the Working Group to be Meaningful
- Suggest that 802.20 Elect an Editor for This Document to Move it Forward
- Suggest 802.20 Issue a “Call for Applications and Requirements” to Solicit Inputs for the Document