

IEEE Standard 802.20™

# Scope of 802.20

- Specification of physical and medium access control layers of an air interface for interoperable mobile broadband wireless access systems, operating in licensed bands below 3.5 GHz, optimized for IP-data transport, with peak data rates per user in excess of 1 Mbps. The specification supports
  - Full vehicular mobility up to 250 Km/h in a MAN environment,
  - High spectral efficiencies,
  - High sustained user data rates and
  - Large numbers of active users in a sector.
- The Specification supports two modes:
  - Wideband Mode (Both TDD and FDD)
  - 625k-MC Mode (TDD)

# **802.20 Specifications and Work Status**

- **Baseline document approved and published 2008**
- **Bridging amendment out on ballot**
- **WG currently only working on maintenance of specifications**
  - **802.20 – Baseline PHY and MAC Specification**
  - **802.20.2 – PICS Proforma**
  - **802.20.3 – Minimum Performance Specification**
  - **802.20a – Amendment to Management Information Base (MIB)**
  - **802.20b – Bridging (Currently in ballot process)**

# Wideband Mode Overview – I

- ✓ Adaptive coding and modulation w/ H-ARQ and turbo coding
- ✓ Short retransmission latency
  - approximately 5.5ms on Forward and Reverse Link (FDD)
  - approximately 10 ms on Forward and Reverse Link Segments (TDD)
- ✓ OFDMA Forward Link with MIMO support
  - single codeword MIMO with closed loop rate & rank adaptation
  - multi-codeword (layered) MIMO with per-layer rate adaptation
  - peak rate over 260Mbps in 20MHz
- ✓ Quasi orthogonal Reverse Link
  - orthogonal transmission based on OFDMA
  - non-orthogonal transmission with multiple receive antennas
  - CDMA control channels
- ✓ Interference management through fractional frequency reuse
  - improved coverage & edge user performance
  - dynamic fractional frequency reuse to optimize bandwidth utilization

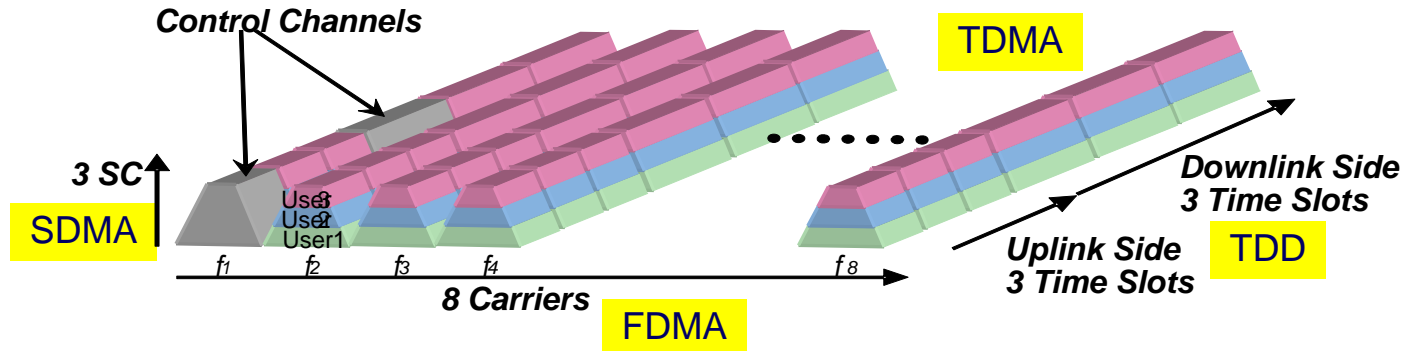
# Wideband Mode Overview – II

- ✓ Optimized throughput / fairness tradeoff through power control
  - distributed power control based on other cell interference
- ✓ Forward Link precoding & SDMA
  - MISO / MIMO closed loop precoding with low-rate feedback
  - combined precoding and space division multiple access
- ✓ Subband scheduling
  - enhanced performance on Forward & Reverse Link
  - multi-user diversity gains for latency sensitive traffic
- ✓ CDMA Reverse Link control segment
  - statistical multiplexing of various Reverse Link control channels
  - fast access with reduced overhead and fast request
  - broadband reference for power control and subband scheduling
  - efficient handoff support
- ✓ Scalable design with an arbitrary bandwidth within 5 - 20MHz

# 625k-Multicarrier (625k-MC) Mode Overview

- Broadband Wireless Internet Access (IP data transport) System that achieves high capacity by application of Multiple Antenna Signal Processing and Spatial Division Multiple Access (SDMA) Technologies in Mobile environment.
- IEEE 802.20's 625k-MC mode specifies a set of enhancements to the High Capacity-Spatial Division Multiple Access (HC-SDMA) Radio Interface Standard (ATIS-0700004.2005)
- Fully backward compatible to the commercially deployed systems based on ATIS HC-SDMA Radio Interface Standard.
- Delivers higher peak user data rates using multiple RF (radio frequency) carriers with 625 kHz carrier spacing
- 625k-MC Mode's baseline system has been globally adopted in both consumer and commercial markets.
  - Commercial Service in 12 Countries (15 Operators) and Field Trial is being in progress in many Countries.

# 625k-MC Layer 1 (L1) Features



- TDD/TDMA/FDMA organization with 5 ms frames
  - Multiple resources permit granular allocation, low latency
  - TDD well matched to adaptive antennas, asymmetric data
- 625 kHz carriers, constant symbol rate of 500 kSymbols/s with 25% root-raised cosine filtering
  - Low complexity spatial-temporal processing
  - Good spatial coherence properties
- Synchronized network
  - Over-the-air AT synchronization, external BS synchronization
  - Predictable inter- and intra-cell interference
- Adaptive modulation and coding
  - Provide robust link, options for inexpensive terminals
  - Link budget to match both directional, non-directional transmissions
- The peak downlink user data rates of 1.493 Mbps and peak uplink user data rates of 571.2kbps in a channel bandwidth of 625 kHz.

# 625k-MC Layer 2 (L2) Protocol Features

- L2 Defines the specifications for reliable transmission including the Radio Link Control (RLC), MAC and logical channel structures.
- L2 Medium Access Control (L2 MAC) sublayer provides dynamic radio access management and control functions to map and transport logical channels onto Physical layer bursts
- Logical channels in support of signaling, control, data transport and broadcast
- Burst structure, message ordering enables efficient spatial and temporal training
- All physical resources available for data and/or control
  - Except for BCH carrier/timeslot pair which enables UT's to Synchronize, determine the best BS both for initial acquisition and for handover



# IEEE 802.20 Standard Adoption in Japan

- ARIB STD-T97 “Mobile Broadband Wireless Access System ( IEEE 802.20 TDD Wideband and 625k-MC Modes Application in Japan)”
  - Ver. 1.0 approved in Sep. 2008
  - Standard consists of Japan’s Radio Regulations and reference to IEEE 802.20 Standard 2008.
  - Specifies requirements of the mobile broadband wireless access systems for the Japanese 2.5 GHz band operation.

# Questions

- Please address questions regarding 802.20 to:

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