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***PHY Nomenclature
Session #17, Levi***

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Target Audience & Objectives

• Intended Users

- Regulatory and Licensing Authorities
- Infrastructure Providers & Spectrum Licensees
- BWA Equipment Vendors and Deployment Planners / Contractors
- BWA Service Providers
- BWA CPE Retailers
- BWA CPE Customers / Purchasers / Recyclers

• Objectives

- Provide a clear, unambiguous set of references which can be called up by the Intended Users to specify their requirements / capabilities in relation to the relevant air interface(s).
- Facilitate clear identification of specific BWA equipment which defines its compatibility / interoperability with other BWA equipment at a standard air interface.

Multi — Element Reference

- **Basic Elements**

- **Name of Standard : IEEE802.16a-2002 WirelessMAN WMAN**
 - ¥ Implies the Common MAC layer (with applicable options, parameters, etc)
- **Frequency Range / Band / Licensing Authority etc**
 - ¥ 10-66GHz, Licensed (various bands, blocks, licensing rules)
 - ¥ 2 — 11GHz Licensed (various bands, blocks, licensing rules)
 - ¥ 2 — 11GHz License Exempt (various bands, blocks, technical rules)
- **PHY Types : WMAN1 WMAN2 WMA N3**
 - ¥ Technology (SC, OFDM, OFDMA, etc), combined with
 - ¥ Multiple Assignment / Dynamic Allocation Techniques (TDMA, OFDMA, SDMA, DFS etc)
 - ¥ Topology (Point-to-Multipoint, Mesh, etc)

- **Optional Modes WMANxA WMANxB WMANxB**

- **Duplexing Method (FDD, TDD, HFDD)**
- **Advanced Antenna Support (Path Diversity, Adaptive Arrays, Adaptive MultiBeam etc)**

- **Operating Parameters (e.g. FFT, FEC, Coding, Modulation etc)**

- **Mandatory**
- **Optional**
- **Fixed and/or Variable**

Initial Proposal

A full specification would therefore read :

IEEE802.16a:2002 WirelessMAN2B/PMP (FDD,MIMO) Or, more simply IEEE WMAN2B/PMP (FDD,MIMO)

Users of the specification would then need to associate the relevant details concerning specific frequency band, regulatory regime, power levels, frequency reuse plan, modulation rates and other engineering / deployment parameters supported by the particular air interface standard and licensing / interoperability options.

Table www : 802.16 PHY Types and Supported Options

PHY TYPE		<i>Included Techniques</i>		<i>Options</i>	
		Modulation	MA	Duplex	AAS
WMAN1 (10-66GHz L)	A/PMP	SC	TDMA	TDD,FDD,HFDD	n/a
	A/MESH	SC	<i>TBD</i>	<i>TBD</i>	<i>Included</i>
WMAN2 (2-11GHz L)	A/PMP	SC	TDMA	TDD,FDD,HFDD	Optional
	B/PMP	OFDM	TDMA	TDD,FDD	Optional
	C/PMP	OFDMA-DVB	TDMA+FDMA	TDD,FDD	Optional
	D/PMP	OFDMA-AMB	TDMA+FDMA+SDMA	TDD	Included
WMAN3 (2-11GHz LE)	B/MESH	OFDM	TDMA	TDD	Included
	B/PMP	OFDM	TDMA	TDD	Optional
	C/PMP	OFDMA-DVB	TDMA+FDMA	TDD,FDD	Optional
WMAN4	X/XXX	<i>TBD</i>	<i>TBD</i>	<i>TBD</i>	<i>TBD</i>

Alternative Proposal (1)

The WMAN1,2,3,4 designation could refer to the modulation technology (SC, OFDM, OFDMA-DVB, OFDMA-AMB), followed by the Frequency Bands (A=10-66GHz, licensed), B=2-11GHz, licensed), C=2-11GHz, unlicensed etc. These would be followed by the applicable topology scheme (PMP, Mesh).

Table xxx : 802.16 PHY Types and Supported Options

PHY TYPE		<i>Included Techniques</i>		<i>Options</i>	
		Frequency	MA	Duplex	AAS
WMAN1 (SC)	A/PMP	10-66GHz L	TDMA	TDD,FDD,HFDD	n/a
	B/PMP	2-11GHz L			
	A/MESH	10-66GHz L	<i>TBD</i>	<i>TBD</i>	<i>Included</i>
WMAN2 (OFDM)	B/PMP	2-11GHz L	TDMA	TDD,FDD,HFDD	Optional
	C/MESH	2-11GHz LE	TDMA	TDD	Included
WMAN3 (OFDMA- DVB)	B/PMP	2-11GHz L	TDMA+FDMA	TDD,FDD	Optional
	C/PMP	2-11GHz LE	TDMA+FDMA	TDD	Optional
WMAN4 (OFDMA- AMB)	B/PMP	2-11GHz L	TDMA+FDMA+SDMA	TDD	Included

Alternative Proposal (2)

The WMAN1,2, designation could refer to the topology (PMP, Mesh), followed by the Frequency Bands (A=10-66GHz, licensed), B=2-11GHZ, licensed), C=2-11GHz, unlicensed etc. These would be followed by the modulation technology (SC, OFDM, OFDMA-DVB, OFDMA-AMB).

Table yyy : 802.16 PHY Types and Supported Options

PHY TYPE		<i>Included Techniques</i>		<i>Options</i>	
		Frequency	MA	Duplex	AAS
WMAN1 (PMP)	A/SC	10-66GHz L	TDMA	TDD,FDD,HFDD	n/a
	B/SC	2-11GHz L	TDMA	TDD,FDD,HFDD	Optional
	B/OFDM	2-11GHz L	TDMA	TDD,FDD,HFDD	Optional
	B/DVB	2-11GHz L	TDMA + FDMA	TDD,FDD	Optional
	B/AMB	2-11GHz L	TDMA+FDMA+SDMA	TDD	Included
WMAN2 (Mesh)	A/SC	10-66GHz L	TBD	TBD	Included
	C/OFDM	2-11GHz LE	TDMA	TDD	Included

Conclusions / Recommendations

- **Pick the Simplest / Clearest Scheme for the Intended Users**
- **For consistency, apply the scheme retrospectively to TG1 air interface with the 802.16a Amendment**
- **Clarify Base-station compatibility and interoperability / coexistence factors**
- **Clarify CPE compatibility and interoperability / coexistence factors and any handshaking / etiquette requirements**
- **Clarify IEEE 802.11/ 802.16 and interoperability / coexistence factors for license-exempt bands**
- ¥ **Clarify AAS Options and interoperability / coexistence factors for licensed bands**