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Source(s)	Itzik kitroser Yossi Segal Yigal Leiba Zion Hadad Runcom Technologies Ltd. 2 Hachoma St. 75655 Rishon Lezion, Israel Voice: +972-3-9528440 Fax: +972-3-9528805 itzikk@runcom.co.il yossis@runcom.co.il yigall@runcom.co.il zionh@runcom.co.il
Re:	Letter Ballot #11 announcement
Abstract	This document presents profiles for the 802.16a OFDMA mode (supplementary text for letter ballot #11 comments)
Purpose	To be integrated into P802.16d/D1-2003 draft document
Notice	
Release	
Patent Policy and Procedures	

OFDMA System Profiles

Itzik Kitroser
Yossi Segal
Yigal Leiba
Zion Hadad

Runcom

General

This contribution provides additional text for letter ballot #11. This is a rewrite of the original profiles document as forced by the Wimax forum.

1 System Profiles

1.1 WirelessMAN-OFDMA and WirelessHUMAN-OFDMA System Profiles

This subclause defines system profiles for systems operating with the WirelessMAN-OFDMA and WirelessHUMAN-OFDMA air interfaces.

Any feature not mandatory or conditionally mandatory for a profile is optional for the profile except where otherwise forbidden by the standard. Optional features shall be implemented as specified in the standard.

Table x1–Profile Definitions

Identifier	Description
OFDMA_ProfM1	WirelessMAN-OFDMA basic packet PMP MAC Profile
OFDMA_ProfP1	WirelessMAN-OFDMA 3.5 MHz channel basic PHY Profile
OFDMA_ProfP2	WirelessMAN-OFDMA 7 MHz channel basic PHY Profile
OFDMA_ProfP3	WirelessMAN-OFDMA 14 MHz channel basic PHY Profile
OFDMA_ProfP4	WirelessMAN-OFDMA 28 MHz channel basic PHY Profile
OFDMA_ProfP5	WirelessHUMAN-OFDMA 10 MHz channel basic PHY Profile
OFDMA_ProfP6	WirelessHUMAN-OFDMA 20 MHz channel basic PHY Profile

1.2 WirelessMAN-OFDMA and WirelessHUMAN-OFDMA System MAC Profiles

This subclause defines MAC profiles for systems operating with the WirelessMAN-OFDMA and WirelessHUMAN-OFDMA air interfaces.

1.2.1 Basic packet PMP MAC profile

Profile identifier: OFDMA_ProfM1.

Mandatory Features:

— Support of Packet convergence sublayer
— Support of Internet Protocol Ipv4
— Support IEEE 802.3/Ethernet specific part
— CRC functionality shall be supported for all connections
— Support of dynamic services
— Support of Best effort services
— Support of Non-Real-Time Polling services
— Support of CDMA based Initial and Periodic Ranging.
— Support of Contention based CDMA bandwidth requests
— DFS shall be required for the license exempt bands only.

1.2.1.1 Conventions for MAC Management Messages

The following rules shall be followed when reporting parameters in MAC Management messages:
— Service Class Names should not be used.
— No TLVs besides Error Encodings and HMAC Tuples shall be reported back in DSA-RSP and DSC-RSP messages.
— No TLVs besides HMAC Tuples shall be reported back in DSA-ACK messages.
— DSC-REQ messages shall not contain Request/Transmission Policy, Fixed vs. Variable Length SDU Indicator, SDU Size, ATM Switching, or Convergence Sublayer Specification TLVs.

1.2.1.2 MAC Management Message Parameter Transmission Order

Systems implementing the profile OFDMA_ProfM1 shall transmit the TLV encoded parameters for mandatory features in the respective messages. Those systems only include the parameters listed under the respective message in its transmission of said messages plus any parameters necessary for optional features. Parameters for optional features shall occur after those listed for support of mandatory features. For the required features, the relevant parameters shall be transmitted in order of increasing Type value of the parameter's TLV key. Parameters with defined default values should be omitted if the desired value coincides with the default one.

1.3 WirelessMAN-OFDMA and WirelessHUMAN-OFDMA System PHY Profiles

This subclause defines PHY profiles for systems operating with the WirelessMAN-OFDMA air interface and WirelessHUMAN-OFDMA air interfaces.

1.3.1 Common features of PHY profiles

All PHY profile shall share the common characteristics as defined in 1.3.1.1- 1.3.1.5 while individual profiles shall be differentiated by the specific characteristics listed for each profile.
If one of the PHY profiles has a parameter, which is different from the parameter defined by the common parameters section, then the values stated in the PHY profile override the value stated in the common parameters section.

1.3.1.1 General Implementation Requirements

The following optional features are not required for implementation of all PHY profiles:
BTC

CTC
64QAM
STC

The following features must be supported by all PHY profiles:

Guard Time
BS shall be capable of using at least one allowed value.
SS shall be capable of detecting and using entire set of allowed values

Frame Duration
SSs shall be capable of operating with any of the Frame Durations as defined at 8.5.4.4.

1.3.1.2 FDD-Specific PHY Profiles Features

Mandatory features:
FDD Operation
BS must respect half-duplex nature of half duplex SSs
Center Frequency for UL must be reported in the UCD channel encoding.

1.3.1.3 TDD-Specific PHY Profiles Features

Mandatory features:
TDD Operation
Center Frequency for UL is not reported in the UCD channel encoding.

1.3.1.4 Wireless-HUMAN PHY Profiles Features

Mandatory features:
TDD Operation
Ability to detect primary users with received signal strength in excess of –61 dBm
Center Frequency for UL is not reported in the UCD channel encoding.
Channel Nr is reported in DCD channel encoding
Ability to switch channel within 300 μs

1.3.1.5 Minimum Performance Requirements

Table x4 lists the minimum performance requirements needed for all profiles

Table x4: Minimum performance requirements for all profiles

Capability	Minimum performance
Tx Dynamic range BS SS	 ≥10 dB ≥30 dB
Tx Power Level minimum adjustment step	≤1 dB
Tx Power Level minimum relative step accuracy	≤ ± 0.5 dB
BS Tx Spectral flatness, when using all subchannels. Absolute difference between adjacent carriers (2.5dB should be added for Pilot carriers within the symbol due to their boosting). Deviation of average energy in each carrier from the measured energy averaged over all 1702 active tones: Carriers -425 to -1 and +1 to +425: Carriers -851 to -425 and +425 to +851:	≤ 0.06 dB ±2 dB +2/-4 dB
SS Tx Spectral flatness, when using all subchannels. Absolute difference between adjacent carriers (2.5dB should be added for Pilot carriers within the symbol due to their boosting) Deviation of average energy in each carrier from the measured energy averaged over all 1696 active tones: Carriers -424 to -1 and +1 to +424: Carriers -848 to -424 and +424 to +848:	≤ 0.06 dB ±2 dB +2/-4 dB
Spectral mask (OOB)	Local regulation
Tx relative constellation error: QPSK-1/2 QPSK-3/4 16QAM-1/2 16QAM-3/4 64QAM-2/3 (if 64QAM supported) 64QAM-3/4 (if 64QAM supported)	 ≤ -19.4 dB ≤ -21.2 dB ≤ -26.4 dB ≤ -28.2 dB ≤ -32.7 dB ≤ -34.4 dB
Rx linearity IIP3	> -10 dBm
Rx max. input level on-channel reception tolerance	≥ -30 dBm
Rx max. input level on-channel damage tolerance	≥ 0 dBm
Number Of Sub-Channels Supported when receiving/transmitting SS BS	 1-32 1-32
1st Adjacent channel rejection at BER=10^{-6} for 3 dB degradation C/I 16QAM-3/4 64QAM-3/4 (if 64-QAM supported)	 ≥ 11 dB ≥ 4 dB
2nd Adjacent channel rejection at BER=10^{-6} for 3 dB degradation C/I 16QAM-3/4 64QAM-3/4 (if 64-QAM supported)	 ≥ 30 dB ≥ 23 dB
TTG and RTG (TDD only)	≥ 5 µs
Reference time tolerance	≤(T_g/T_b)/2 µs

1.3.2 WirelessMAN-OFDMA 3.5 MHz channel basic PHY Profile

Profile identifier: OFDMA_ProfP1.

Systems implementing OFDMA_ProfP1 shall meet the minimum performance requirements listed in Table x6:

Table x6: Minimum performance requirements for OFDMA_ProfP1

Capability	Minimum performance
Channel Bandwidth	3.5 MHz
Operation Mode	Licensed band usage only
BER performance threshold, BER=10^{-6} (using all Sub-channels BS/SS) QPSK-1/2 QPSK-3/4 16QAM-1/2 16QAM-3/4 64QAM-2/3 (if 64QAM supported) 64QAM-3/4 (if 64QAM supported) (Add to sensitivity 10*$\log_{10}$(NumberOfSubChannelsUsed/32) when using less sub-channels in the BS Rx)	 ≤ -87 dBm ≤ -84 dBm ≤ -80 dBm ≤ -77 dBm ≤ -73 dBm ≤ -71 dBm
Reference frequency tolerance BS SS to BS synchronization tolerance	 ≤ +/- 4 ppm ≤ 20 Hz
Frame Duration code set	{4,7}

1.3.3 WirelessMAN-OFDMA 7 MHz channel basic PHY Profile

Profile identifier: OFDMA_ProfP2.

Systems implementing OFDMA_ProfP2 shall meet the minimum performance requirements listed in Table x7:

Table x7: Minimum performance requirements for OFDMA_ProfP2

Capability	Minimum performance
Channel Bandwidth	7 MHz
Operation Mode	Licensed band usage only
BER performance threshold, BER=10^{-6} (using all Sub-channels BS/SS) QPSK-1/2 QPSK-3/4 16QAM-1/2 16QAM-3/4 64QAM-2/3 (if 64QAM supported) 64QAM-3/4 (if 64QAM supported) (Add to sensitivity 10*$\log_{10}$(NumberOfSubChannelsUsed/32) when using less sub-channels in the BS Rx)	 ≤ -84 dBm ≤ -81 dBm ≤ -77 dBm ≤ -74 dBm ≤ -71 dBm ≤ -68 dBm
Reference frequency tolerance BS SS to BS synchronization tolerance	 ≤ +/- 4 ppm ≤ 40 Hz
Frame Duration code set	{2,3,5}

1.3.4 WirelessMAN-OFDMA 14 MHz channel basic PHY Profile

Profile identifier: OFDMA_ProfP3.

Systems implementing OFDMA_ProfP3 shall meet the minimum performance requirements listed in Table x8:

Table x8: Minimum performance requirements for OFDMA_ProfP3

Capability	Minimum performance
Channel Bandwidth	14 MHz
Operation Mode	Licensed band usage only
BER performance threshold, BER=10^{-6} (using all Sub-channels BS/SS), QPSK-1/2 QPSK-3/4 16QAM-1/2 16QAM-3/4 64QAM-2/3 (if 64QAM supported) 64QAM-3/4 (if 64QAM supported) (Add to sensitivity 10*$\log_{10}$(NumberOfSubChannelsUsed/32) when using less sub-channels in the BS Rx)	 ≤ -81 dBm ≤ -78 dBm ≤ -74 dBm ≤ -71 dBm ≤ -67 dBm ≤ -65 dBm
Reference frequency tolerance BS SS to BS synchronization tolerance	 ≤ +/- 4 ppm ≤ 80 Hz
Frame Duration code set	{2,3,5}

1.3.5 WirelessMAN-OFDMA 28 MHz channel basic PHY Profile

Profile identifier: OFDMA_ProfP4.

Systems implementing OFDMA_ProfP4 shall meet the minimum performance requirements listed in Table x9:

Table x9: Minimum performance requirements for OFDMA_ProfP4

Capability	Minimum performance
Channel Bandwidth	28 MHz
Operation Mode	Licensed band usage only
BER performance threshold, BER=10^{-6} (using all Sub-channels BS/SS). QPSK-1/2 QPSK-3/4 16QAM-1/2 16QAM-3/4 64QAM-2/3 (if 64QAM supported) 64QAM-3/4 (if 64QAM supported) (Add to sensitivity 10*$\log_{10}$(NumberOfSubChannelsUsed/32) when using less sub-channels in the BS Rx)	 ≤ -78 dBm ≤ -75 dBm ≤ -71 dBm ≤ -68 dBm ≤ -64 dBm ≤ -62 dBm
Reference frequency tolerance BS SS to BS synchronization tolerance	 ≤ +/- 4 ppm ≤ 160 Hz
Frame Duration code set	{2,3,5}

1.3.6 WirelessHUMAN-OFDMA 10 MHz channel basic PHY Profile

Profile identifier: OFDMA_ProfP5.

Systems implementing OFDMA_ProfP5 shall meet the minimum performance requirements listed in Table x10:

Table x10: Minimum performance requirements for OFDMA_ProfP5

Capability	Minimum performance
Channel Bandwidth	10 MHz
Operation Mode	Licensed-exempt band usage only
BER performance threshold, BER=10^{-6} (using all Sub-channels BS/SS) QPSK-1/2 QPSK-3/4 16QAM-1/2 16QAM-3/4 64QAM-2/3 (if 64QAM supported) 64QAM-3/4 (if 64QAM supported) (Add to sensitivity $10*\log_{10}$(NumberOfSubChannelsUsed/32) when using less sub-channels in the BS Rx)	 ≤ -82 dBm ≤ -79 dBm ≤ -75 dBm ≤ -72 dBm ≤ -68 dBm ≤ -66 dBm
Reference frequency tolerance BS SS to BS synchronization tolerance	 ≤ +/- 4 ppm ≤ 55 Hz
Frame Duration code set	{2,4,5}

1.3.7 WirelessHUMAN-OFDMA 20 MHz channel basic PHY Profile

Profile identifier: OFDMA_ProfP6.

Systems implementing OFDMA_ProfP6 shall meet the minimum performance requirements listed in Table x11:

Table x11: Minimum performance requirements for OFDMA_ProfP6

Capability	Minimum performance
Channel Bandwidth	20 MHz
Operation Mode	Licensed-exempt band usage only
BER performance threshold, BER=10^{-6} (using all Sub-channels BS/SS) QPSK-1/2 QPSK-3/4 16QAM-1/2 16QAM-3/4 64QAM-2/3 (if 64QAM supported) 64QAM-3/4 (if 64QAM supported) (Add to sensitivity $10*\log_{10}$(NumberOfSubChannelsUsed/32) when using less sub-channels in the BS Rx)	 ≤ -79 dBm ≤ -76 dBm ≤ -72 dBm ≤ -69 dBm ≤ -65 dBm ≤ -63 dBm
Reference frequency tolerance BS SS to BS synchronization tolerance	 ≤ +/- 4 ppm ≤ 110 Hz
Frame Duration code set	{2,4,5}

1.4 WirelessMAN-OFDMA and WirelessHUMAN-OFDMA RF profiles

This subclause defined RF profiles for the WirelessMAN-OFDMA and WirelessHUMAN-OFDMA air interfaces.

RF Profile Name	Channel	UL	DL
OFDMA_ProfR1	3.5	2524.75 + n·1.75 MHz, ∀n∈{0,1, …,38}	2598.75 + n·1.75 MHz, ∀n∈{0,1, …,38}
OFDMA_ProfR2	3.5	3411.75 + n·1.75 MHz, ∀n∈{0,1, …,18}	3461.75 + n·1.75 MHz, ∀n∈{0,1, …,18}
OFDMA_ProfR3	3.5	3501.75 + n·1.75 MHz, ∀n∈{0,1, …,55}	3551.75 + n·1.75 MHz, ∀n∈{0,1, …,55}
OFDMA_ProfR4	3.5	3601.75 + n·1.75 MHz, ∀n∈{0,1, …,55}	3651.75 + n·1.75 MHz, ∀n∈{0,1, …,55}
OFDMA_ProfR5	3.5	3701.75 + n·1.75 MHz, ∀n∈{0,1, …,55}	3751.75 + n·1.75 MHz, ∀n∈{0,1, …,55}
OFDMA_ProfR6	7	2526.5 + n·1.75 MHz, ∀n∈{0,1, …,36}	2600.5 + n·1.75 MHz, ∀n∈{0,1, …,36}
OFDMA_ProfR7	7	3413.5 + n·1.75 MHz, ∀n∈{0,1, …,16}	3463.5 + n·1.75 MHz, ∀n∈{0,1, …,16}
OFDMA_ProfR8	7	3503.5 + n·1.75 MHz, ∀n∈{0,1, …,53}	3553.5 + n·1.75 MHz, ∀n∈{0,1, …,53}
OFDMA_ProfR9	7	3603.5 + n·1.75 MHz, ∀n∈{0,1, …,53}	3653.5 + n·1.75 MHz, ∀n∈{0,1, …,53}
OFDMA_ProfR10	7	3703.5 + n·1.75 MHz, ∀n∈{0,1, …,53}	3753.5 + n·1.75 MHz, ∀n∈{0,1, …,53}
OFDMA_ProfR11	14	2530 + n·1.75 MHz, ∀n∈{0,1, …,32}	2604 + n·1.75 MHz, ∀n∈{0,1, …,32}
OFDMA_ProfR12	14	3417+n·1.75 MHz, ∀n∈{0,1, …,12}	3467 + n·1.75 MHz, ∀n∈{0,1, …,12}
OFDMA_ProfR13	14	3507 + n·1.75 MHz, ∀n∈{0,1, …,49}	3550 + n·1.75 MHz, ∀n∈{0,1, …,49}
OFDMA_ProfR14	14	3607 + n·1.75 MHz, ∀n∈{0,1, …,49}	3650 + n·1.75 MHz, ∀n∈{0,1, …,49}
OFDMA_ProfR15	14	3707 + n·1.75 MHz, ∀n∈{0,1, …,49}	3750 + n·1.75 MHz, ∀n∈{0,1, …,49}
OFDMA_ProfR16	28	2537 + n·1.75 MHz, ∀n∈{0,1, …,24}	2611 + n·1.75 MHz, ∀n∈{0,1, …,24}
OFDMA_ProfR17	28	3424+ n·1.75 MHz, ∀n∈{0,1, …,4}	3473 + n·1.75 MHz, ∀n∈{0,1, …,4}
OFDMA_ProfR18	28	3514 + n·1.75 MHz, ∀n∈{0,1, …,41}	3557 + n·1.75 MHz, ∀n∈{0,1, …,41}
OFDMA_ProfR19	28	3614 + n·1.75 MHz, ∀n∈{0,1, …,41}	3657 + n·1.75 MHz, ∀n∈{0,1, …,41}
OFDMA_ProfR20	28	3714 + n·1.75 MHz, ∀n∈{0,1, …,41}	3757 + n·1.75 MHz, ∀n∈{0,1, …,41}
OFDMA_ProfR21	10	5000+ n·5 MHz, ∀n∈{55,57,59,61,63,65,67}	N/A
OFDMA_ProfR22	10	5000+ n·5 MHz, ∀n∈{148, 150, 152, 154, 156, 158, 160, 162, 164, 166}	N/A
OFDMA_ProfR23	10	5000+ n·5 MHz, ∀n∈{147, 149, 151, 153, 155, 157, 159, 161, 163, 165, 167, 169}	N/A
OFDMA_ProfR24	20	5000+ n·5 MHz, ∀n∈{56,60,64}	N/A
OFDMA_ProfR25	20	5000+ n·5 MHz, ∀n∈{149, 153, 157, 161, 165}	N/A
OFDMA_ProfR26	20	5000+ n·5 MHz, ∀n∈{148, 152, 156, 160, 164, 168}	N/A

Notes:

(a) For 10,20 MHz channels, a spectral mask as defined in 8.6.2 should be applied.

(b) For FDD and H-FDD cases, both uplink and downlink shall have the same n value.

References

[1] IEEE P80216d_D1-2003 “Part 16: Air Interface for Fixed Broadband Wireless Access Systems - Amendment 3: Detailed System Profiles for 2-11 GHz”