

Clause 45 changes for US Superframe

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Parameter Summary

Durations

- D_{Cu} - US cyclic Prefix duration (us)
 $= \{1.25, 1.875, 2.5, 3.125, 3.75 \text{ us}\}$
- D_{Su} - US Symbol duration including CP (us)
 $= 20\text{us} + D_{Cu}$
- D_{RB} - Resource Block duration (us)
 $= N_{RB} * D_{Su} = \{8, 12, 16\} * D_{Su}$
- D_p - Probe duration (us)
 $= N_p * D_{Su} = \{2, 3, 4, ?\} * D_{Su}$
- D_{PLu} - US PHY Link Frame duration (us)
 $= D_{SF} - D_p$
- D_{SF} - Superframe duration (us)
 $= N_{SF} * D_{RB} + D_p$
- D_{PD} - PHY Discovery response duration (us)
 $= 32 * D_{Su}$ (fixed in standard)
- D_{PDW} - PHY Discovery Window duration (us)
 $= N_{PDW} * D_{RB}$
- D_{FR} - Fine Ranging **response** duration (us)
 $= 68 * D_{Su}$ (fixed in standard?)
- D_{FRW} - Fine Ranging Window duration (us)
 $= D_p$

Spectrums

- S_{Ou} - US OFDM spectrum (Resource Elements)
- S_{RB} - Resource Block spectrum (kHz)
 $= 50\text{kHz} * \{1, 4, \text{or } 8\}$
- S_{PLu} - US PHY Link (kHz)
 $= N_{PLu} * S_{RB}$ (see details)
- S_{PD} - PHY Discovery response spectrum (kHz)
 $= (32?) * 50 \text{ kHz}$ (fixed in standard?)
- S_{PDG} - PHY Discovery Window Guardband spectrum (kHz)
 $= \text{TBD} * 50 \text{ kHz}$ (fixed in standard)
- S_{PDW} - PHY Discovery Window spectrum (kHz)
 $= 48 * 50 \text{ kHz}$
- S_{FR} - Fine Ranging **response** spectrum (kHz)
 $= 128 * 50 \text{ kHz}$ (fixed in standard)
- S_{FRW} - Fine Ranging window spectrum (kHz)
 $= \text{TBD} * 50 \text{ kHz}$ (fixed in standard)
- S_{FRG} - Fine Ranging Guardband spectrum (RB)
 $= \text{TBD} * 50$ (fixed in standard)

Volumes

$$V_{PLu} = (D_{SF} - D_p) * S_{PLu} \approx V_{FR} \approx V_{PDW}/2$$

(if straddling Probe)

$$V_{PD} = D_{PD} * S_{PD}$$

TBD
Update

Constants

Symbol duration (D_B) = 20us

Subcarrier spectrum
= 50 kHz

PHY Discovery response duration
= TBD (32?) symbols

PHY Discovery response spectrum (N_{PDS})
= TBD (32?) Subcarriers

PHY Discovery Window spectrum (S_{PDW})
= 48 * 50 kHz(kHz)

Fine Ranging Window duration (D_{FRW})
= D_{RB} (us)

Fine Ranging window spectrum (S_{FRW})
= TBD * 50 kHz (fixed in standard, kHz)

Fine Ranging response duration (Sym)
= 6 & symbols

Fine Ranging response spectrum (N_{FRS})
= 128 Subcarriers = 6400 kHz

~~TBD~~

S_{PDG} – PHY Discovery Window Guardband
spectrum (kHz)

= TBD * 50 kHz (fixed in standard)

S_{FRG} – Fine Ranging Guardband spectrum (RB)
= TBD * 50 (fixed in standard)

TBD
Update

CI 45 additions needed

Resource Block definitions

Resource Block duration [1.19bb.7:8]

the number of symbols in a resource block (N_{RBD}), also
the number of symbols in an OFDMA frame and the
length of the US Time interleaver
enum {8, 12, 16}

Resource Block spectrum [1.19bb.9:10];

the number of subcarriers in a Resource block (N_{RBS})
enum {1, 4, or 8}

Probe definitions

Probe duration [1.19bb.11:12];

the number of symbols in a Probe (N_p)
enum {2, 3, 4, ?}

Superframe definitions

Superframe duration [TBD] (N_{SF});

the number of OFDMA frames in a Superframe
4b integer (?)
constraint: $\min \leq (N_{SF} * N_{RBD} + 2) \leq \max$ (sym)

US PHY Link, PHY Discovery & Fine Ranging definitions

~~US PHY Link spectrum [1.19ff.12:15] (N_{PLu});~~

~~the number of resource blocks in the US PHY Link
spectrum range
4b integer (?)~~

~~constraint: $\min \leq (N_{PLu} * N_{RBS}) \leq \max$ (SC)~~

PHY Discovery starting subcarrier [1.19gh.11:0];

starting sub-carrier for the PHY Discovery response
signal from 0 to 4095 in steps of 1 Sub-carriers
12b integer

Fine Ranging starting subcarrier [1.19xx.11:0];

starting sub-carrier for the Fine Ranging response signal
from 0 to 4095 in steps of 1 Sub-carriers
12b integer

TBD

S_{PD} – PHY Discovery response spectrum (kHz)

= 32 * 50 kHz (fixed in standard?)

S_{PDG} – PHY Discovery Window Guardband spectrum
(kHz)

= TBD * 50 kHz (fixed in standard)

S_{FRG} – Fine Ranging Guardband spectrum (RB)

= TBD * 50 (fixed in standard)

TBD

CI 45 modifications needed

45.2.a.115.1 PHY Discovery duration [1.19gh.15:13]

Current: The PHY Discovery duration bits 1.19gg.15:13 are used to set the duration, in PHY Link frames, of the next PHY Discovery window.

Proposed: The PHY Discovery **Window** duration bits **1.19gh.15:12** are used to set the duration, in **OFDMA** frames, of the next PHY Discovery window.
(N_{PDW})

this equates to a max RTT of 2,550 us at D_{Su} of 21.25 us

45.2.a.115.2 PHY Discovery **Window** start [1.19gg.15:0]

Current: The PHY Discovery start bits 1.19gg.12:0 determine when the next PHY Discovery window is opened relative to the local PHY Link frame counter

Proposed: The PHY Discovery **Window** start bits **1.19gg.15:0** determine when the next PHY Discovery window is opened relative to the **Timestamp**

Note: existing CNU's are not allowed to transmit in a resource block overlapping the PHY Discovery Window spectrum that would be transmitted coincident with this timestamp. New CNU's are not permitted to transmit before this timestamp (see 102.4)

TBD

Update

Change to draft

Resource Block register definition (proposed)

- Resource Block duration
 - the number of symbols in Resource Blocks
 - 2 b field
x x
1 1 = reserved
1 0 = 16 symbols per resource block
0 1 = 12 symbols per resource block
0 0 = 8 symbols per resource block
 - RW
 - Part of US OFDM desc. .
(Reg 19bb)
- Resource Block spectrum
 - the number of subcarriers in Resource Blocks
 - 2b field
x x
1 1 = reserved
1 0 = 8 subcarriers per resource block
0 1 = 4 subcarriers per resource block
0 0 = 1 subcarrier per resource block
 - RW
 - Part of US OFDM desc.
(Reg 19bb)

Other registers to think about

- Burst Marker in use
 - Enum List
 - Part of profile definition
- US/DS Signal Quality (MER?)
 - Per SC?, Pilot?, RB?
 - Units/range of parameter?
- Probe control
 - Some parameters defined in baseline text, nothing in CL 45
- RF On/Off time?
- US/DS errored FEC Frames (CRC errors)
 - Data path & PHY Link
- US/DS error free FEC Frames
 - Data path & PHY Link
- US/DS Symbol count?
- Other???
 - CLT/CNU Rx Equalize Coefficients?
 - Trigger mechanism?

Questions?

Comments?

THANK YOU