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Re:

Abstract: Comment Resolution

Purpose: Information to be used to describe functionality of new coexistence option

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NBPAN MPM Enhanced Coexistence

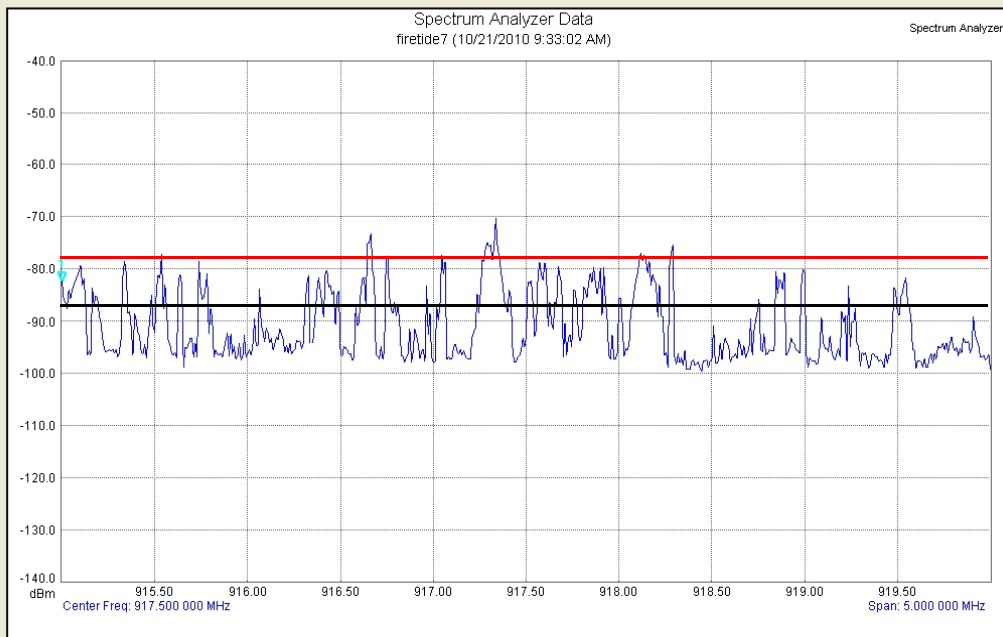
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Does 802 really need CSM ?

— 802.15.4G Min ACR limit
— Rx Sensitivity + 3db

Example of real-world 902-928 ISM spectrum (Rural)



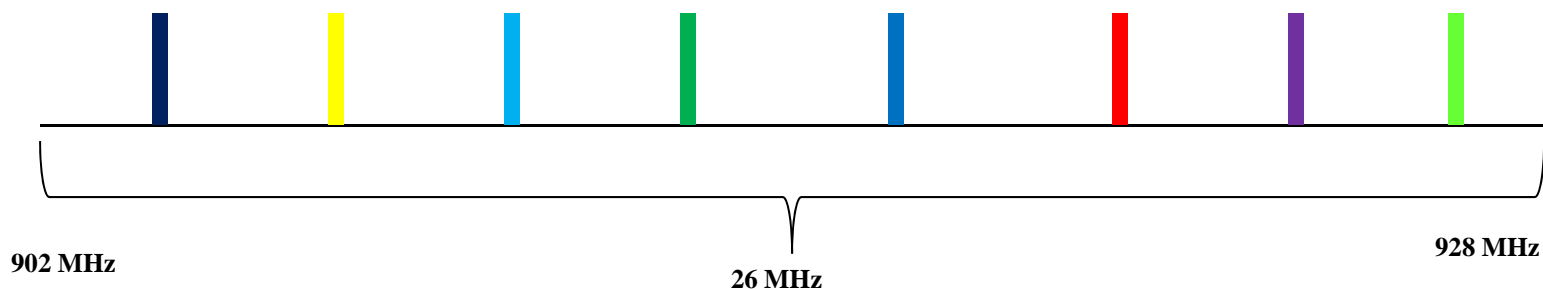
| Measurement Parameters | | | |
|------------------------|-----------------|-----------------|-----------------------|
| Trace Mode | Max Hold | Frequency Span | 5.000 000 MHz |
| Preamp | ON | Reference Level | -40.000 dBm |
| Min Sweep Time | 0.001 S | Scale | 10.0 dB/div |
| Reference Level Offset | 0.0 dB | Operator Name | |
| Input Attenuation | 0.0 dB | Tower | |
| RBW | 1.0 kHz | Serial Number | 1018077 |
| VBW | 1.0 kHz | Base Ver. | V3.38 |
| Detection | Peak | App Ver. | V4.35 |
| Center Frequency | 917.500 000 MHz | Model | MS2712E |
| Start Frequency | 915.000 000 MHz | Options | 25_31 |
| Stop Frequency | 920.000 000 MHz | Date | 10/21/2010 9:33:02 AM |
| | | Device Name | |



Enhanced Beacons and Beacon Requests

- The latest version of the 802.15.4G amendment has introduced two new information sharing mechanisms , Enhanced Beacons and Enhanced Beacon Requests. They are fundamentally identical to the existing 802.15.4I defined beacons and beacon requests but have been enhanced to include all of the operational PHY details.
- It is the intension of this presentation to define how the non-beacon enabled PAN operation currently defined within 802.15.4-2006 may be implemented utilizing the newly defined EB and EBR mechanism to enhance coexistence between the 3 otherwise orthogonal PHY's included in the 4G draft amendment.
- The use of NPPAN eliminates the requirement for existing PAN coordinators to continuously transmit MPM beacons to achieve enhanced coexistence
- A significant reduction in retransmissions is likely in densely utilized bands

CSM Example For 902-928 ISM Band



902-928 Band = 128 Valid Channels

“N” = Number of CSM signaling channels = Floor (Valid channels / 16 = 8 (for the 902-928 band)

1/16th of the available channels available in the band selected for coding efficiency
(additional research may be required to validate this is the ideal value)

X =1 For N X=X+1

CSM CHANNEL NUMBER = X(floor (((Max Valid Channel -1) – (Min Valid Channel +1) / N))

CSM 01 = 01(floor ((128 -1) – (1+1) / 8)) = 015

CSM02 = 02(floor ((128 -1) – (1+1) / 8)) = 030

CSM 03 = 03(floor ((128 -1) – (1+1) / 8)) = 045

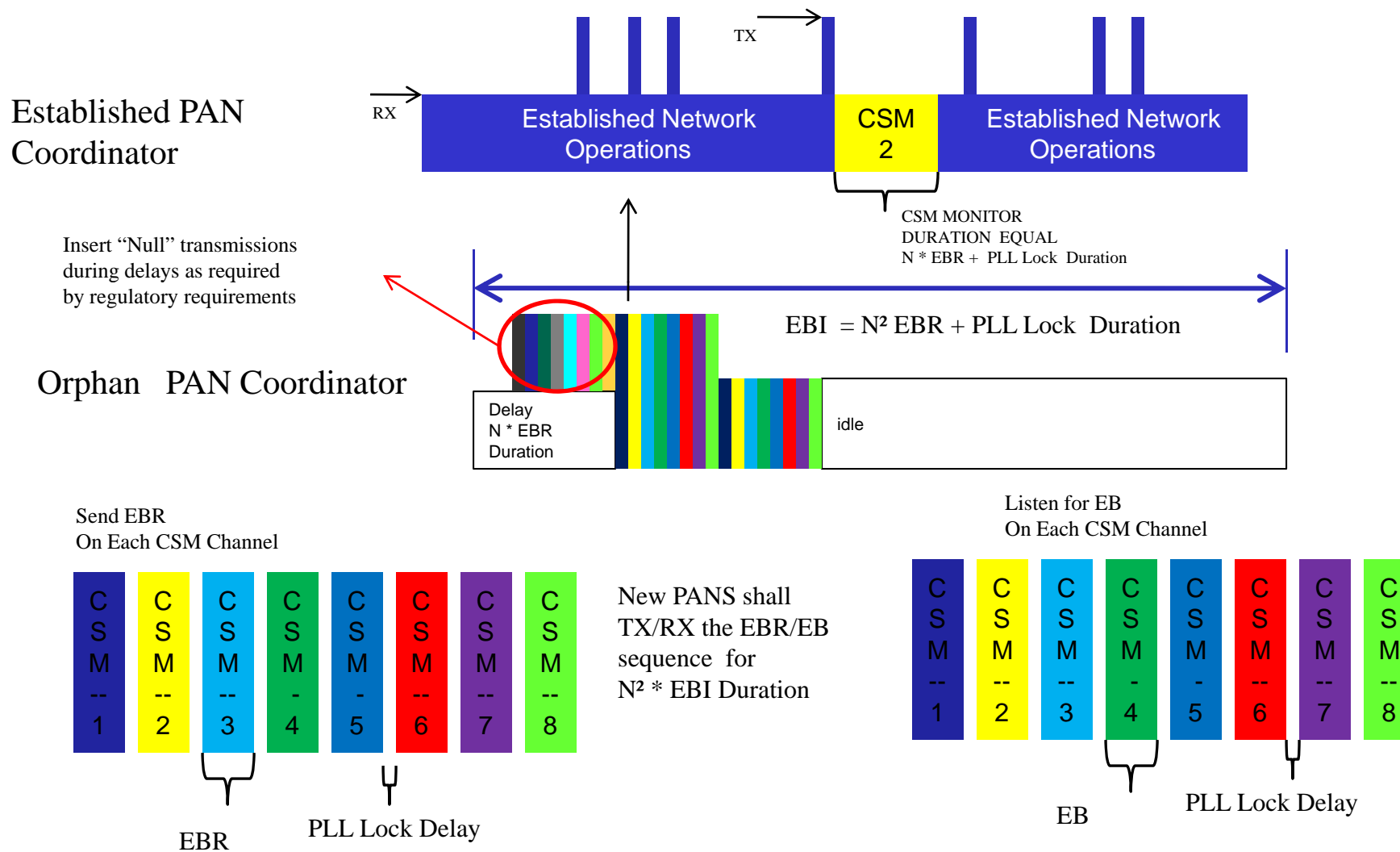
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CSM 08 = 08(floor ((128 -1) – (1+1) / 8)) = 120

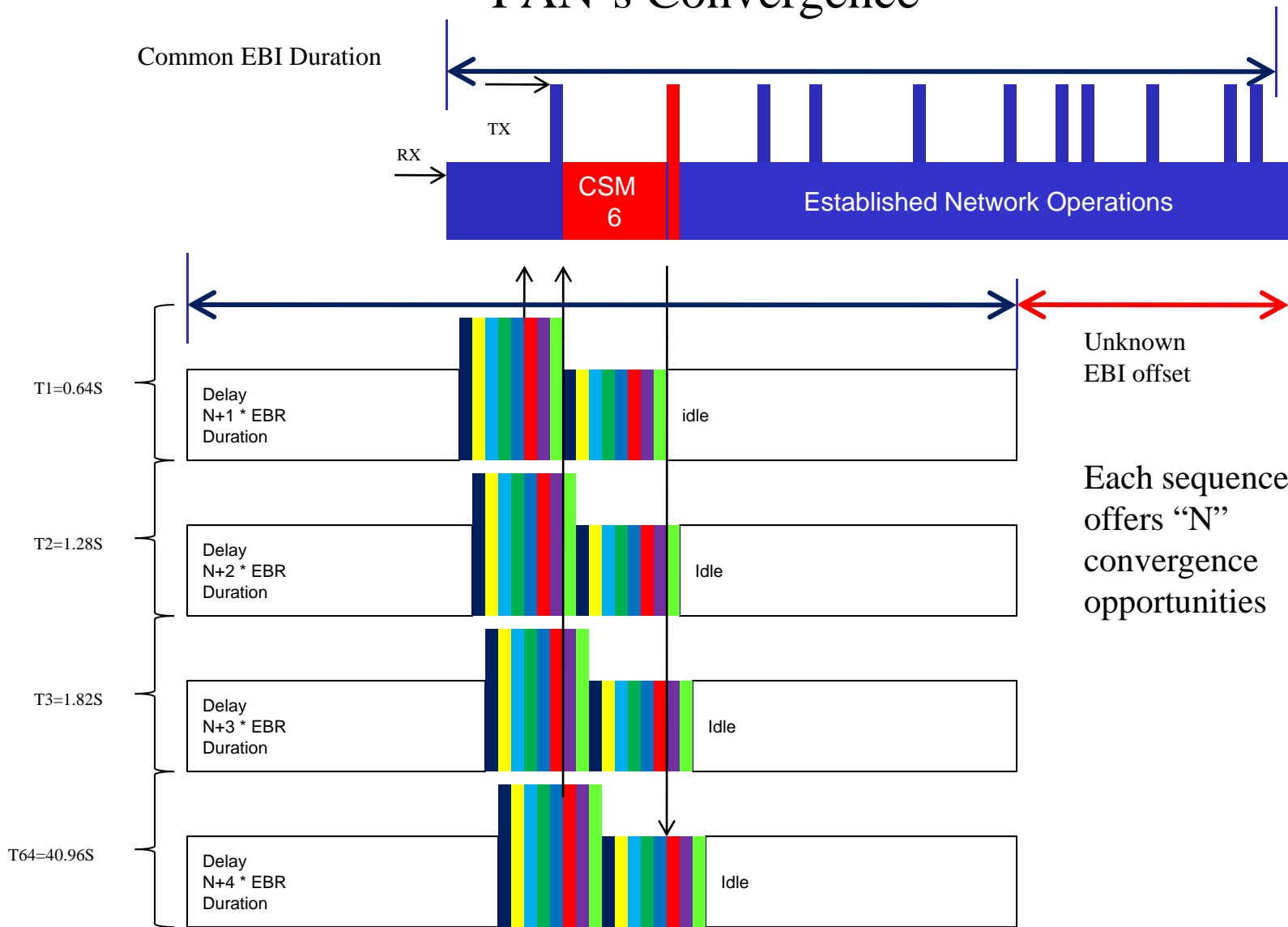
“N” = Number of channels used for CSM signaling

CSM defined channels may be use for network traffic when necessary

EBR & EB Signaling Sequence



PAN's Convergence



Unknown EBI offset

Each sequence offers "N" convergence opportunities

Dynamic Network Priority Definition

Network Traffic Priority

12.5% EBR Monitor (1 of 8 slots)

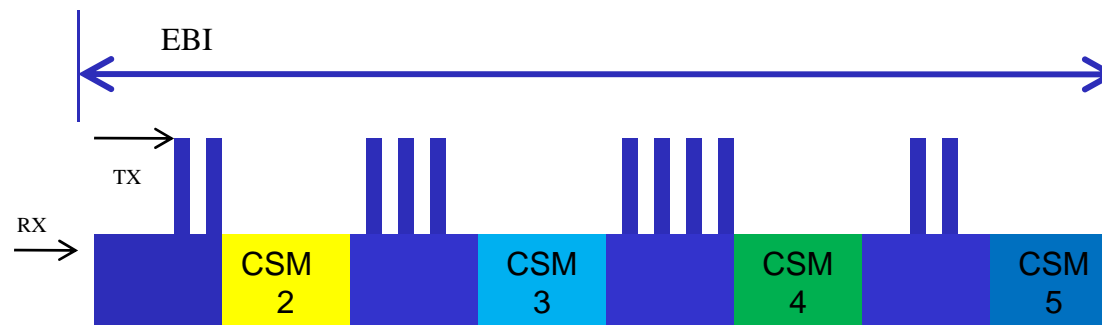
$$\text{Max Converge Time} = \text{EBI Duration} * N^2 \text{ Attempts} = 0.64S * 64 = 40.96 S$$



Co-Existence Priority

50 % EBR Monitor (4 of 8 slots)

$$\text{Max Converge Time} = (\text{EBI Duration} * N^2 \text{ Attempts}) / 4 = 0.64S * 64 / 4 = 10.24 S$$



?Questions ?

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