

Coordination of PHY Discovery

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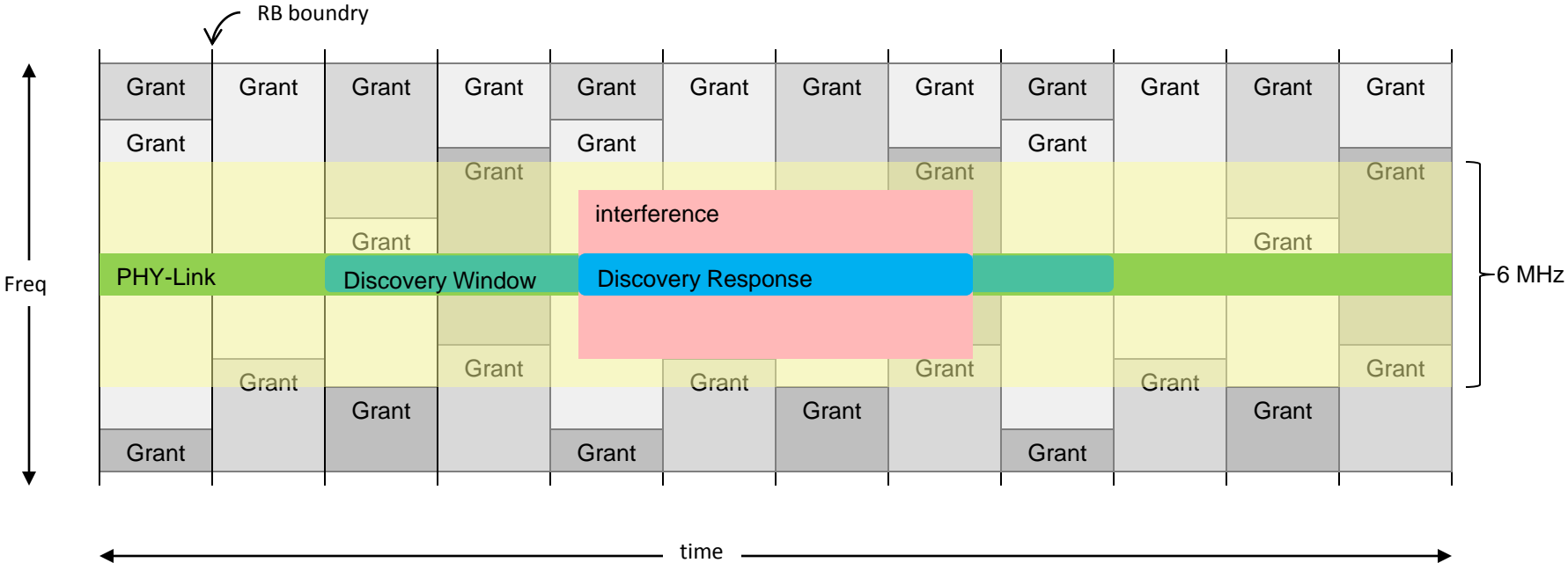
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Motivation

- **PHY Discovery will potentially interfere with data capacity**
 - Before fine tuning is completed new transmitters are not orthogonal to the rest of the network.
 - Subcarriers within the 6 MHz band containing the PHY-Link will experience interference.
 - Result is loss of US data capacity around the virtual time period surrounding the PHY-Link

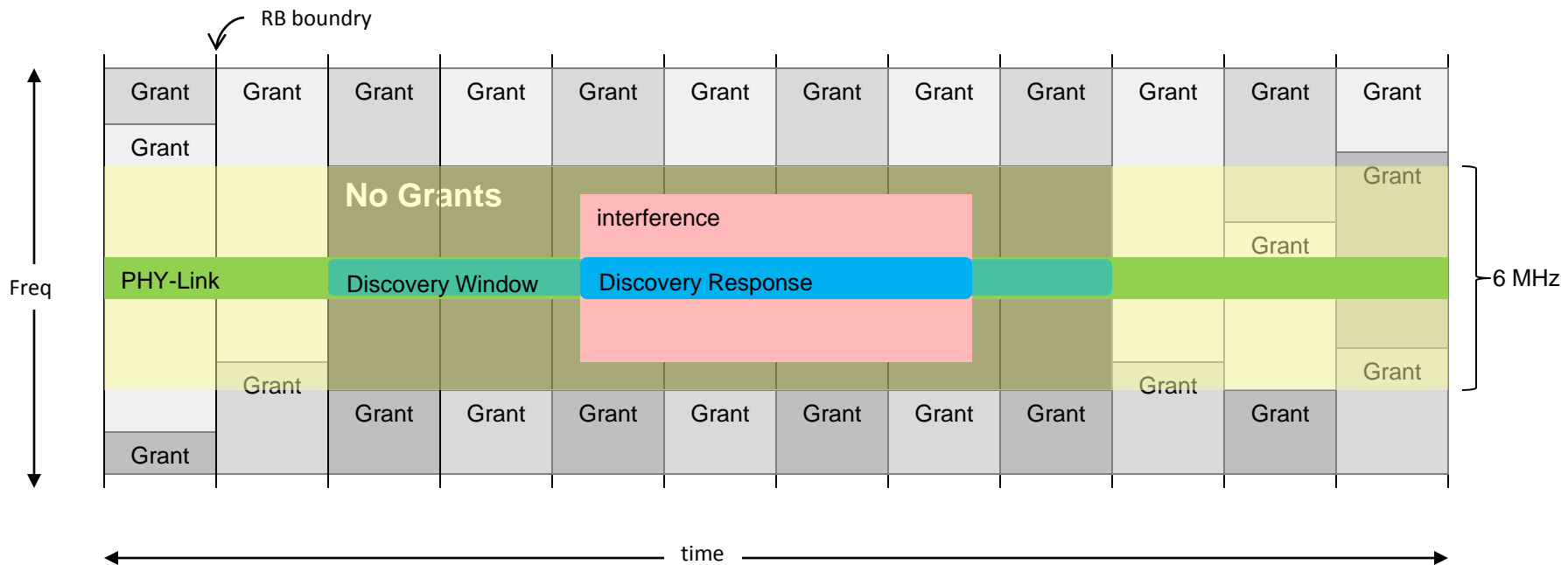
Interference illustration



Potential Solution

- **Allow PHY Discovery windows to be initiated and controlled by the upper layers**
 - Allow upper layer to coordinate with grant engine and avoid issuing grants in frequencies affected by interference during PHY Discovery windows
 - Allow upper layer to control the size of the PHY Discovery window
- **Mechanism should also allow PHY to issue autonomous periodic PHY Discovery windows if desired**

Mitigation illustration



Some assumptions used in time calculations

- Symbol size is 20 us
- CP size is 1 us
- PHY-Link frame is 255 symbols or 5.355 ms

MDIO PHY Discovery control Registers

- **PHY Discovery Window Complete flag**
 - Flag indicating most recent ranging window has completed
- **PHY Discovery Start Time**
 - the PHY-Link frame number the PHY Discovery window begins on
 - 13b (up to 43.9 sec in the future)
- **PHY Discovery Duration**
 - the number of PHY-Link frames the ranging window is open
 - 3b (up to 42.8 ms)
- **PHY Discovery Period**
 - Time between discovery windows if periodic
 - If > 0 then PHY Discovery is autonomous and periodic
 - If = 0 then PHY Discovery is scheduled by upper layers
 - 13b (up to once every 43.9 sec)
- **PHY Frame Count**
 - RO 13b register which indicates the current PHY Link frame count

MDIO definitions

10GPASS-XR PHY Discovery control register 1 bit definitions			
Bit(s)	Name	Description	R/W
x.w.15:13	PHY Discovery Duration	Duration of next open PHY Discovery window relative to the PHY Frame Counter	RW
x.w.12:0	PHY Discovery Start	Time of next open PHY Discovery window relative to PHY-Link frame counter.	RW

10GPASS-XR PHY Discovery control register 2 bit definitions			
Bit(s)	Name	Description	R/W
x.x.15	PHY Discovery Complete flag	1=PHY Discovery window is open or will open when Frame Counter[12:0] = PHY Discovery Start. 0=PHY Discovery window is closed.	RW
x.x.14:13	Reserved	Ignored on write	RO
x.x.12:0	PHY Discovery Period	Period, in PHY Frames, between PHY Discovery windows. Allows upper layers to control the frequency of PHY Discovery windows. Setting to zero allows upper layers to directly control PHY Discovery window via the PHY Discovery Complete flag	RW

10GPASS-XR PHY frame counter bit definitions			
Bit(s)	Name	Description	R/W
x.z.15:0	PHY Frame Counter	Counter that indicates the PHY-Link frame currently being processed by the PHY. This counter rolls over to zero and is incremented at the beginning of each PHY-Link frame	RO

Abbreviations for SD

PHY Discovery

PHY Discovery Duration

PHY Discovery Start

PHY Discovery Complete flag

PHY Discovery Period

PHY Frame Counter

PD

PDDuration

PDStart

PDComplete

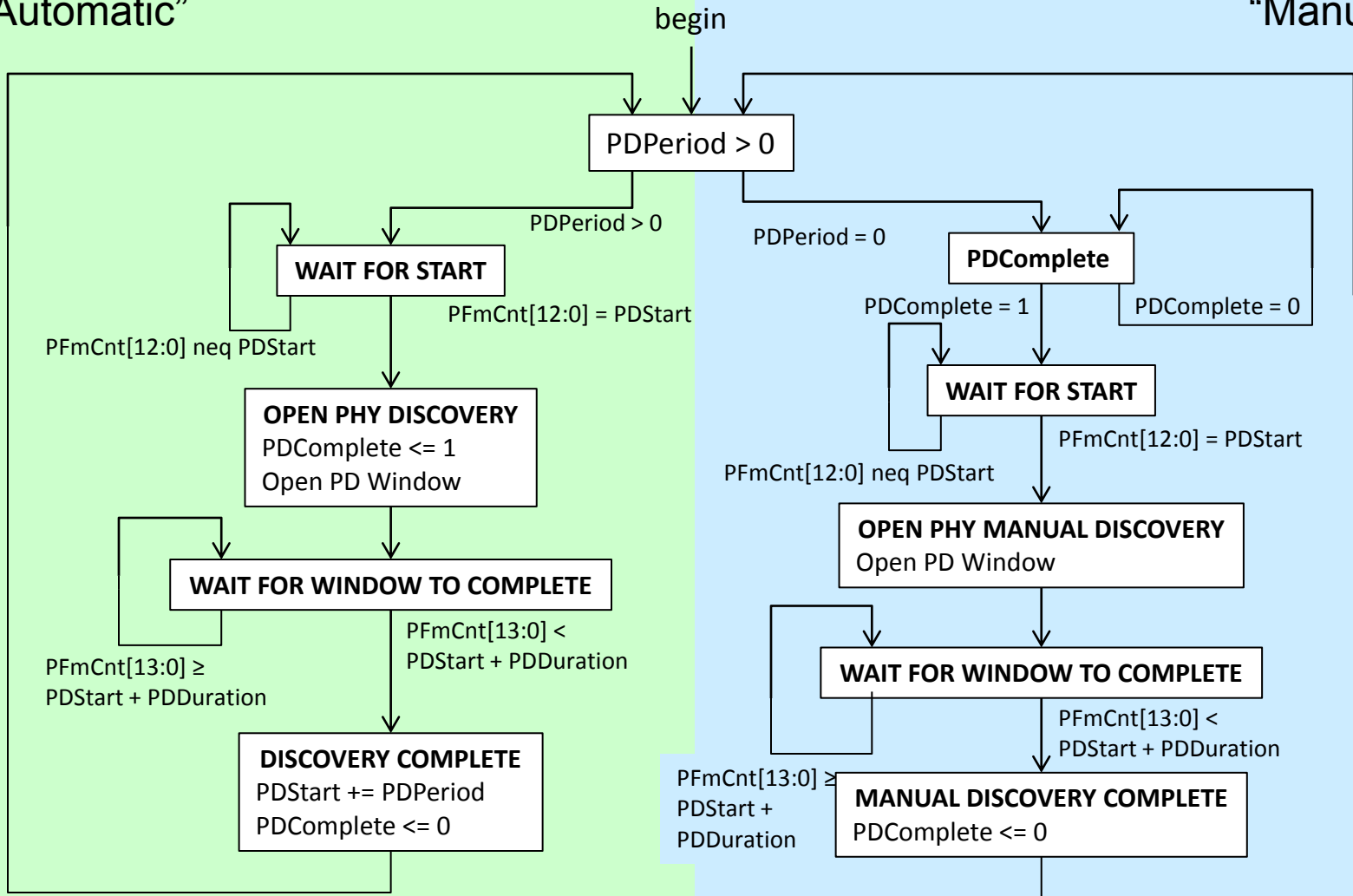
PDPeriod

PFmCnt

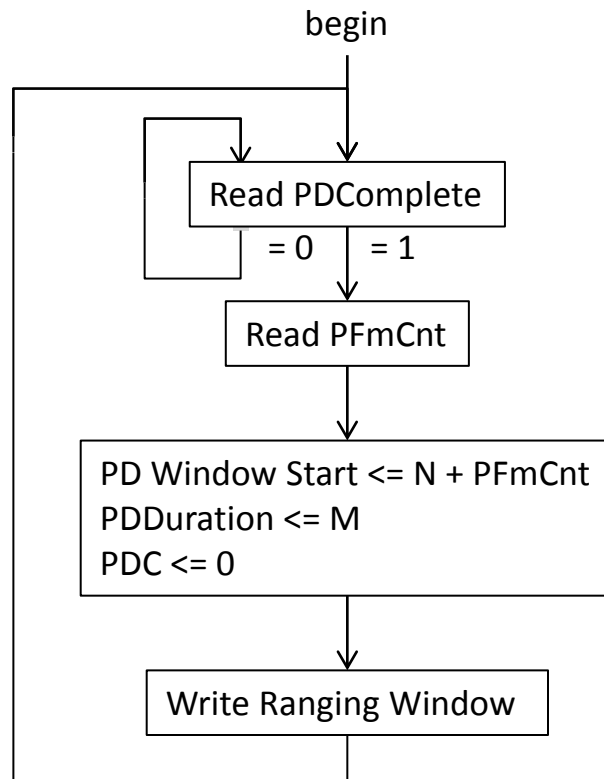
PHY Discovery process

“Automatic”

“Manual”



“Manual PHY Discovery process (info only, upper layer perspective)”



Thank you

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Motion

Move to accept as baseline material the concepts outlined in remain_3bn_05_0114.pdf slide 2, 4, 7, 8 & 10 for initiation and control of the PHY Discovery window and incorporate into the draft.

Moved: Duane Remein

Second:

For:

Against:

Abstain:

Motion is Technical ($\geq 75\%$) Procedural ($> 50\%$)

Motion Passed/Failed

- **Why bigger PHY Discovery windows?**

- When the network is recovering from a “cold start” a large window can be created to help avoid time overlap between multiple CNU's responding in the same window
- Conversely when the network is fully populated frequency and duration of PHY Discovery windows can be decreased