A Look At COMWAKE For Use In SNW3

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The Transmitter

- Transmitters send COMWAKEs with precise timing
- A COMWAKE is
  - Gap 160 OObI (106.666 ns)
  - Burst 160 OObI (106.666 ns)
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  - Burst 160 OObI (106.666 ns)
  - Negation Gap 280 OObI (186.666 ns)
- For each “bit window” the transmitter either sends this sequence

<table>
<thead>
<tr>
<th></th>
<th>160 OObI</th>
<th>280 OObI</th>
<th>2200 OObI</th>
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</thead>
<tbody>
<tr>
<td>Gap</td>
<td>(106.666 ns)</td>
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<tr>
<td>Burst</td>
<td>(106.666 ns)</td>
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<tr>
<td>Negation Gap</td>
<td>(186.666 ns)</td>
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<td></td>
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<tr>
<td>TOTAL</td>
<td>(1466.666 ns)</td>
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</table>
These could be important!
Detection of a COMWAKE requires detection of 4 consecutive Idle time/Burst time pairs. (Idle first, then Burst)
COMWAKE Detection

A receiver “may detect” a Burst with as little as one transition.
- No minimum detected Burst time specified
- Shall at 100 ns
- No maximum Burst time specified
  • But transmitter must send it right!

A receiver must wait for the next Burst to start to determine if an Idle time is of the proper size.
- There is a maximum Idle Time that must be met to declare the Idle time a valid COMWAKE Idle time.
COMWAKE Detection Uncertainty

From the time that the beginning of a COMWAKE appears at the input of the Receiver to the time that the Receiver signals the detection of the COMWAKE is:

Earliest: 1280 OOBI (746.66 ns)
  4 Idle times plus 4 Burst times

Latest: 1920 OOBI (1280.00 ns)
  Detect at the end of the last Burst.

Uncertainty: 640 OOBI (426.66 ns)
These could be Important!

Points of possible detection
Not Quite So Uncertain

- If the COMWAKE is preceded by more 68.67 ns of idle time, then the first Idle time/Burst time pair are disqualified because the Idle time exceeds the “shall not detect” time.
  - Shall not detect: 175.00 ns
  - Transmitted time: 106.66 ns
  
  Maximum “pre-idle” 68.67 ns

- This WILL occur for each “bit time” other than the first.
  - The COMWAKE negation time insures it.

- We can require it before the first COMWAKE
Not Quite So Uncertain

Long Pre-Idle

No Longer a possible point of detection

Points of possible detection

1\textsuperscript{st} COMWAKE

Burst

Burst

Burst

Burst

Burst

Burst

Negation

Idle

Idle

Idle

Idle

Idle

Idle
COMWAKE Detection Uncertainty With Long Pre-Idle

From the time that the beginning of a COMWAKE appears at the input of the Receiver to the time that the Receiver signals the detection of the COMWAKE is:

Earliest: 1600 OOBI (960.00 ns)
5 Idle times plus 5 Burst times.

Latest: 1920 OOBI (1280.00 ns)
Detect at the end of the last Burst.

Uncertainty: 320 OOBI (213.33 ns)
Sampling Is Easy And Accurate

- Detect the first COMWAKE.
- Use this as the time reference
- Generate a Strobe 320 OOBI after the first detect and every 2200 OOBI after that.
- Generate a Clear 640 OOBI after the first detect and every 2200 OOBI after that.
- Set a flop every time a COMWAKE is detected.
- Sample the flop on every Strobe
- Clear the flop on every Clear.
Sampling Is Easy And Accurate

Detect (early)

Strobe (early)

Clear (early)

Latched Detect (early strobe)

Detect (late)

Strobe (late)

Clear (late)

Latched Detect (late strobe)
Reference Clock Tolerance

- We will have to consider the Reference Clock tolerance (+/- 100 ppm).
- If the transmissions are limited to the 109 usec SNTT time, and we use 2 times the clock tolerance as the difference between the transmitters frequency and the receivers frequency, then the maximum clock delta is less than 33 OOBIs.
- We have nearly 10 times that in window opening
Conclusions

- It can be done, easily.
- One simple solution can be shown. Many other implementations are possible.
- The only requirement is that the transmitter keep the bus Idle for a minimum of 68.67 ns before sending the sequence of bits.
- If we keep the requirements for RCDT field, this requirement is met.