FC-FS-6
Fabric Notifications
A Beautiful Day in the Neighborhood

Authors

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T11-2019-00083-v003

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Table of Contents

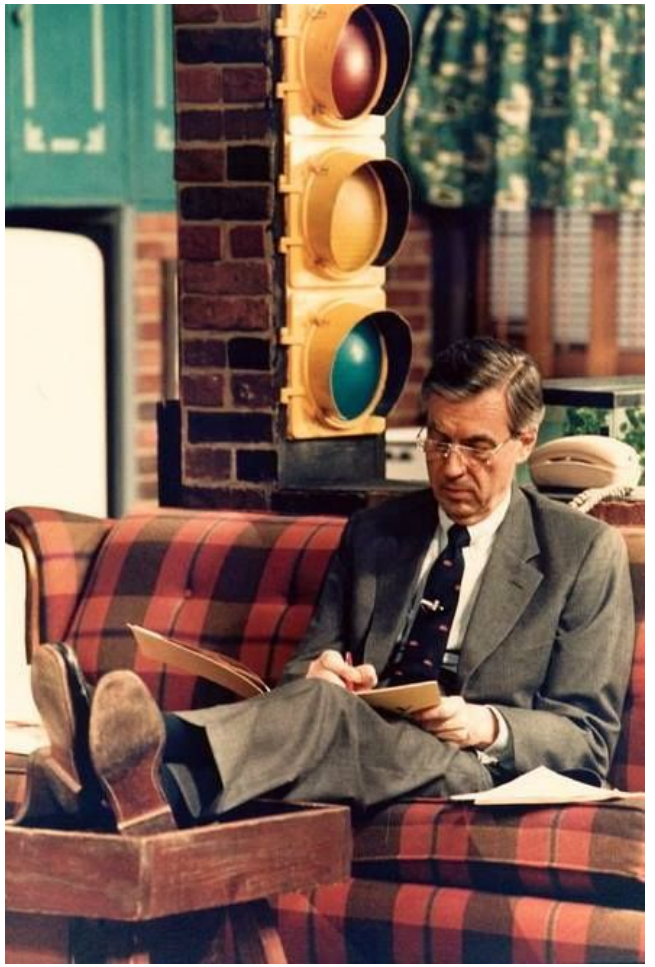
- Draft Text
  - Summary
- Signal behavior diagrams
- Move to Incorporate (text)

Draft Text Summary

Edits from October

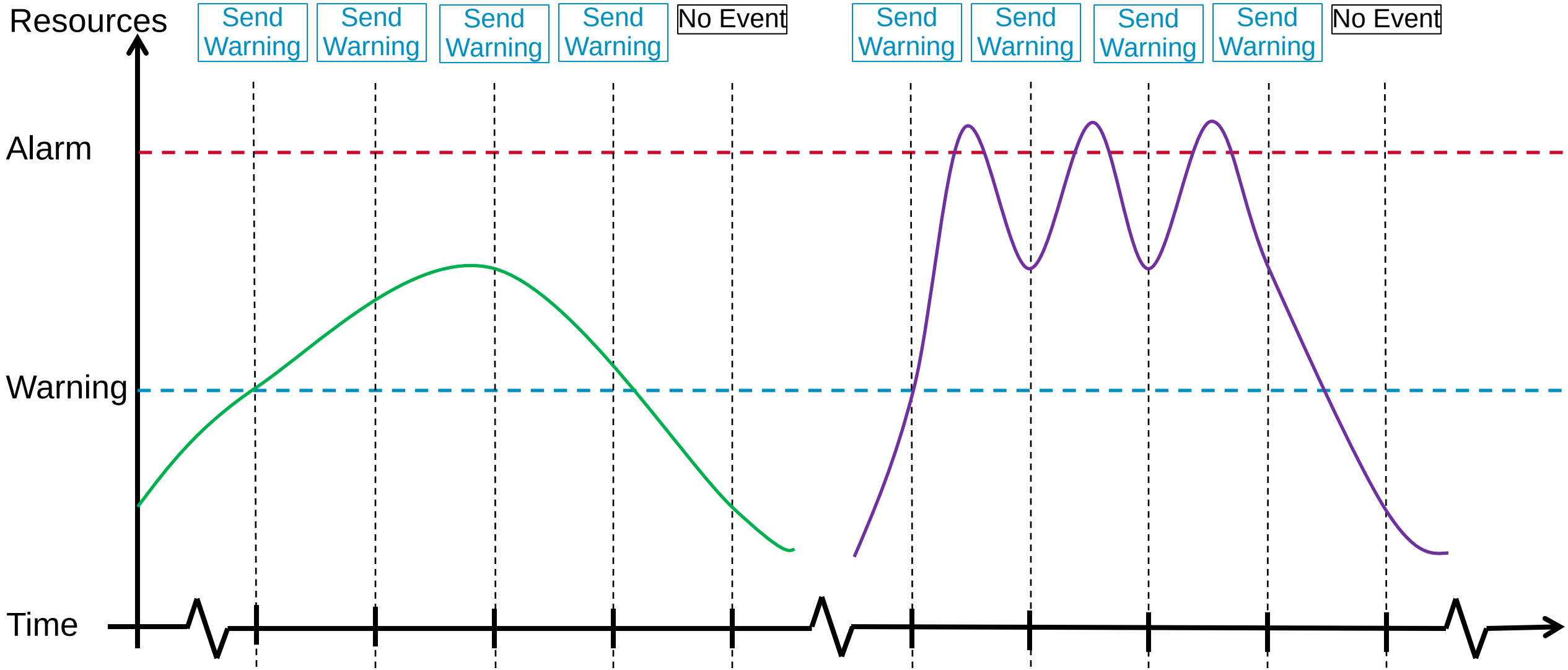
- 25.1
  - Replace a/b list with updated text
  - Replace transmitting/transmit with supporting/support
  - Indicate thresholds are outside of the scope of the standard

- 25.2
  - 25.2.1
    - Incorporate updated text for definition
    - Remove redundant FC-LS-5 reference
  - 25.2.2
    - Incorporate updated text for definition



Signal Behavior

Example: Warning Signal (sustained and spikes)



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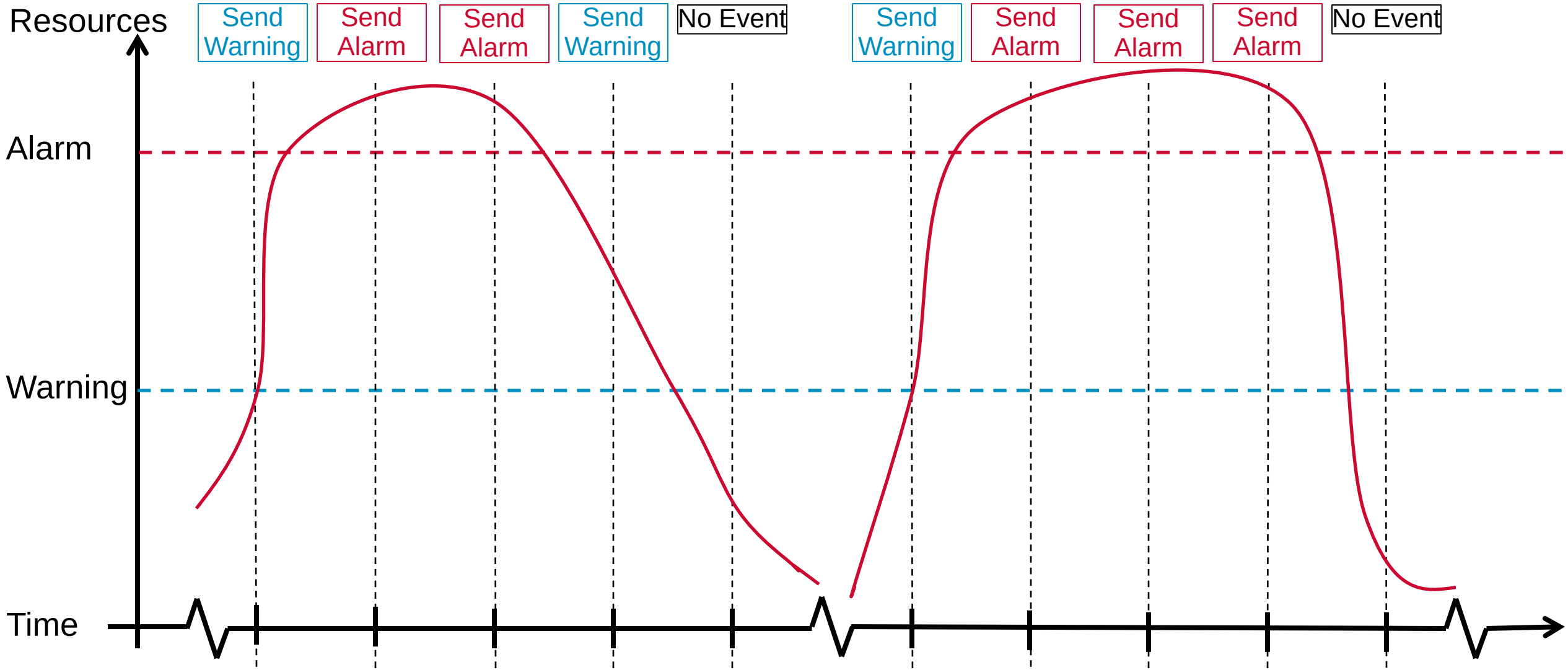
Signal Behavior

Example: Alarm Signal (sustained)



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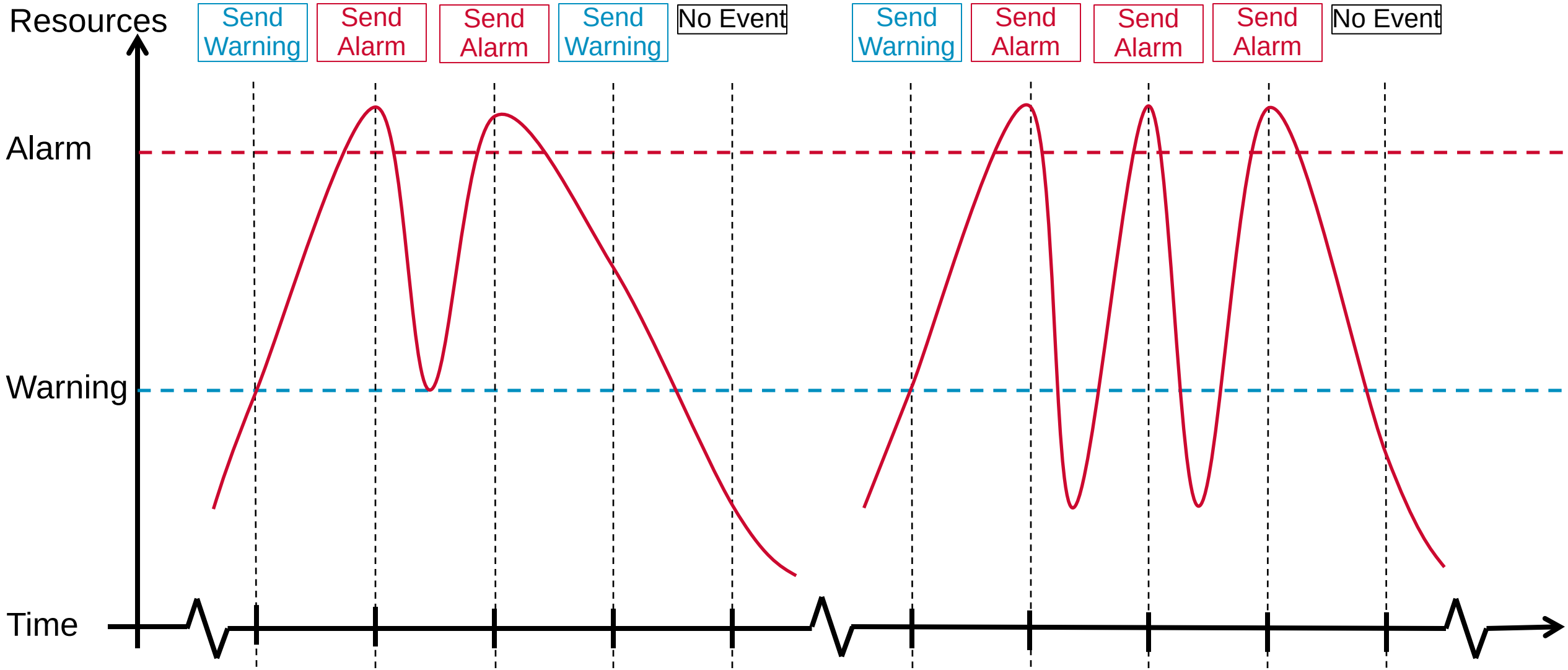
Signal Behavior

Example: Alarm Signal (spikes)



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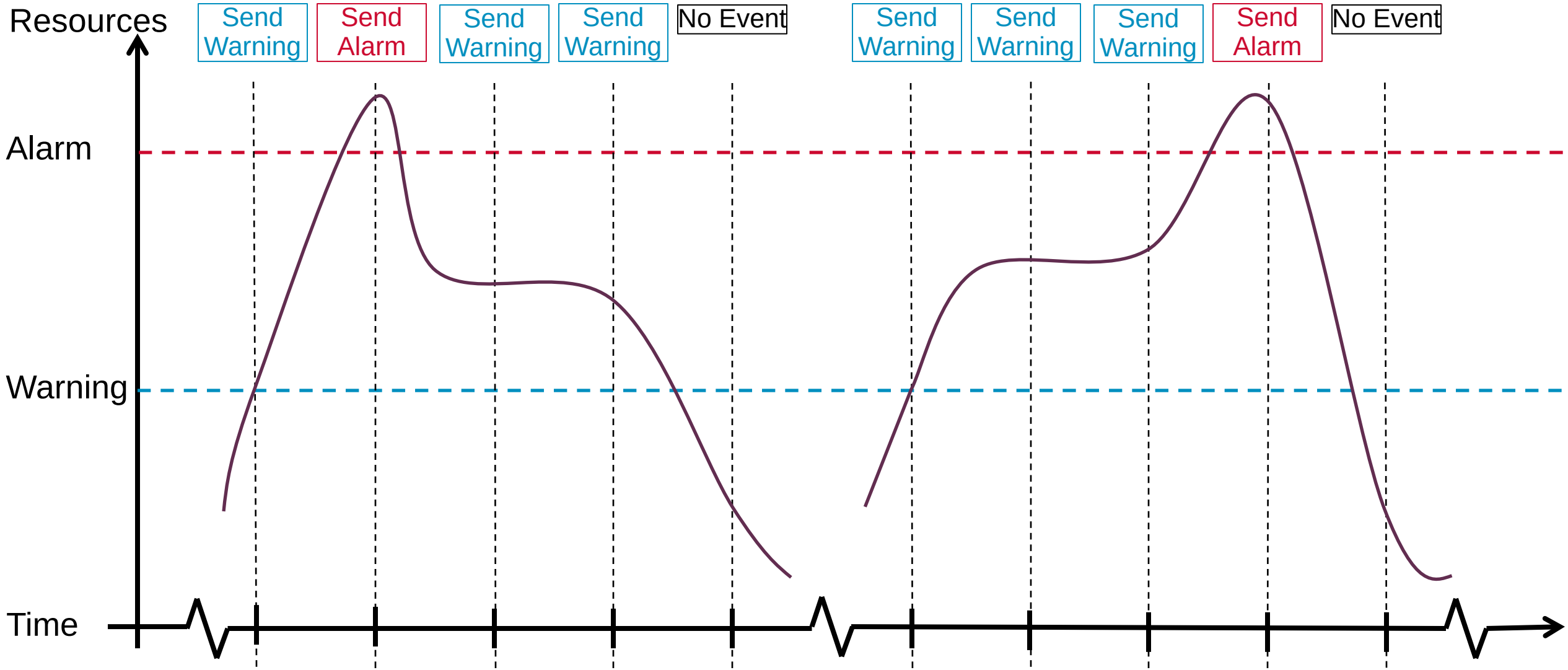
Signal Behavior

Example: Spike to sustained/Sustained to spike



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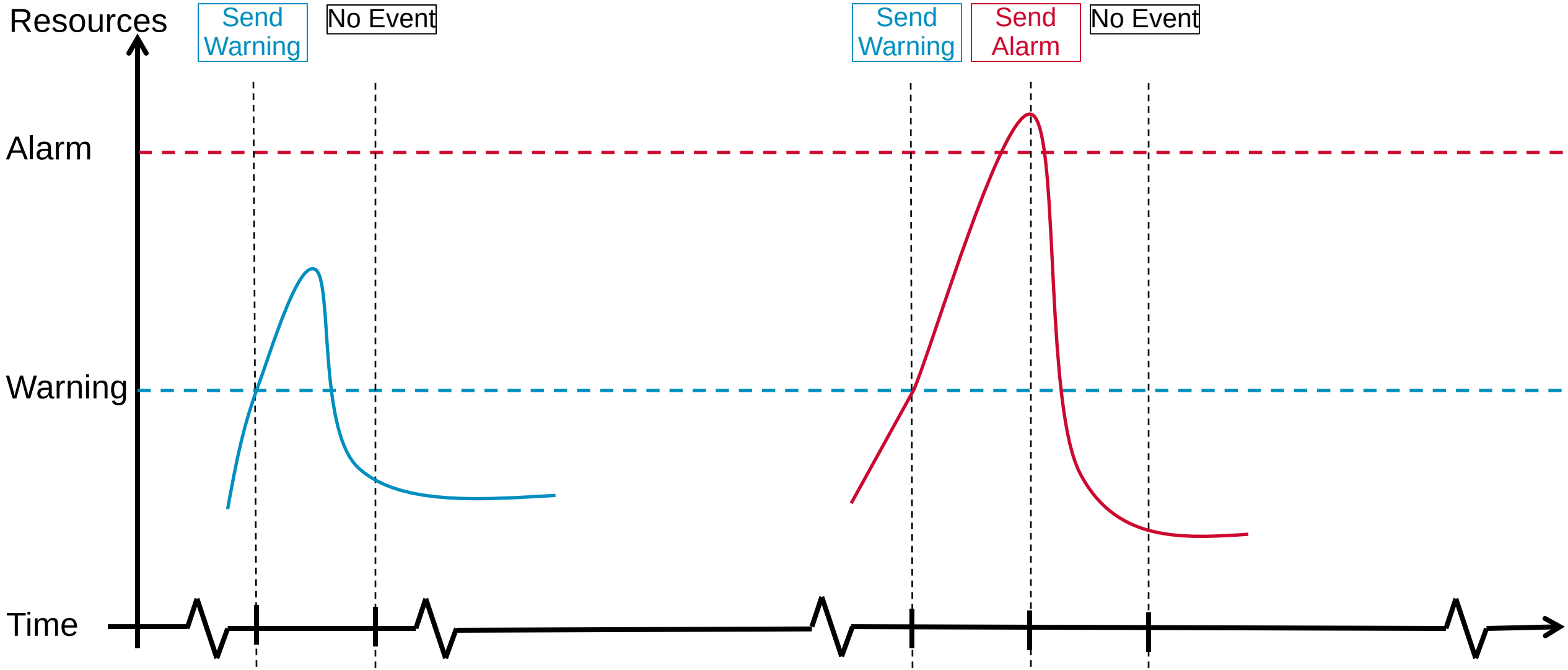
Signal Behavior

Example: Spikes



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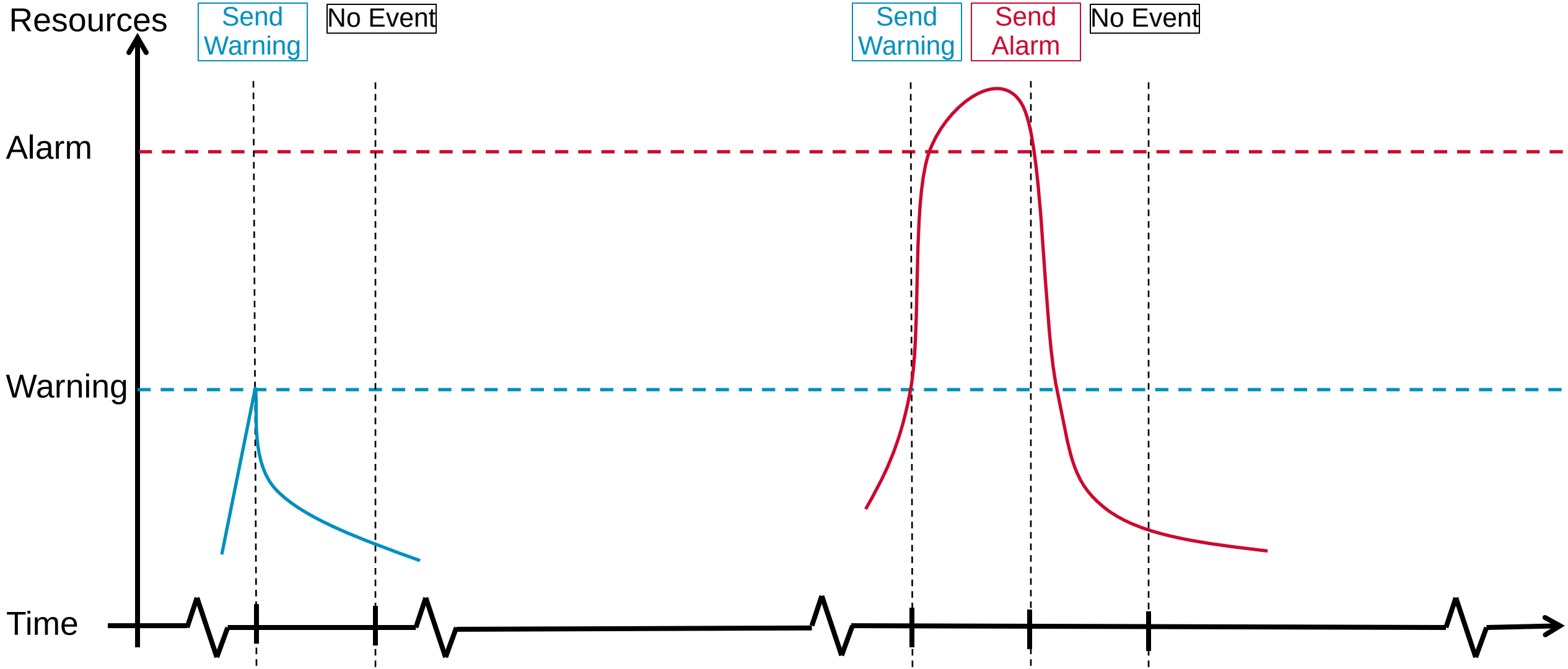
Signal Behavior

Example: Spikes (again)



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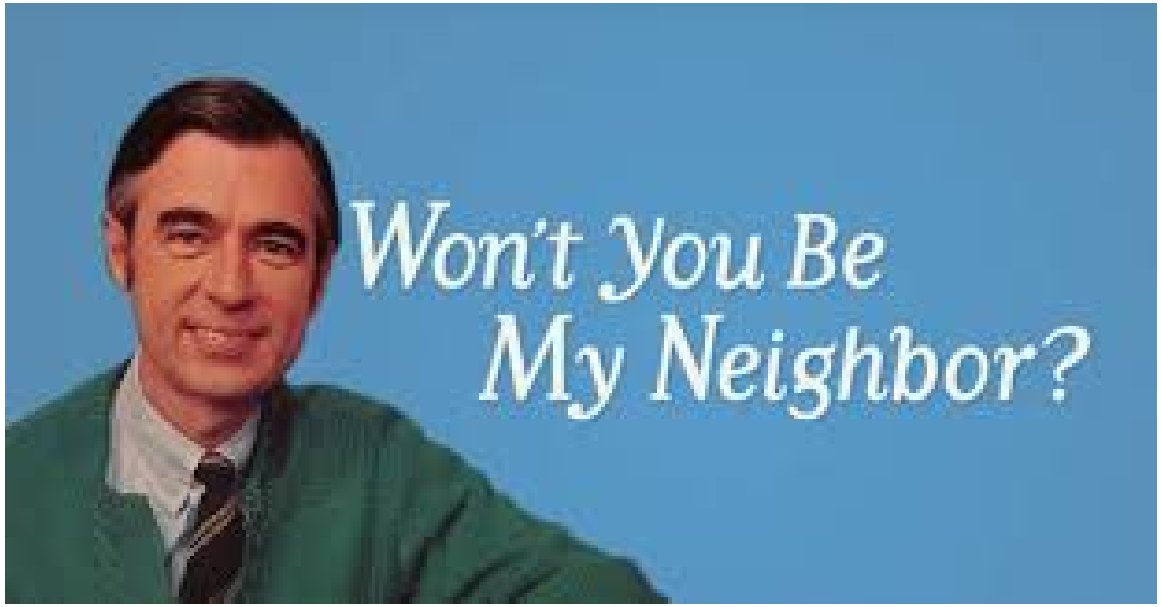
Next Steps

Fabric Notifications

- Motion
  - Move to incorporate T11-2019-00215-v004 into FC-FS-6
- Discussion
  - How should diagrams be incorporated?
    - FC-FS-6
      - Text?
      - Annex?
    - FC-SW-8
      - Theory of Operation



Thank You

Howard Johnson

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References

Notes from October 2019 Meeting

(2019-00083-v002)

Draft Text Summary

Edits from August

- 25.1
  - Formatted “Overview” correctly
  - Clarified attachment (first and second FC_Port)
  - Clarified EDC description
  - Included character definitions in Table 14
- 25.2.1 Transmission and Processing
  - Removed
- 25.3.1 Warning Congestion Signal
  - Clarified behavior description
- 25.3.2 Alarm Congestion Signal
  - Clarified behavior description (made consistent with 25.3.1)
  - Clarified transition from Alarm to Warning

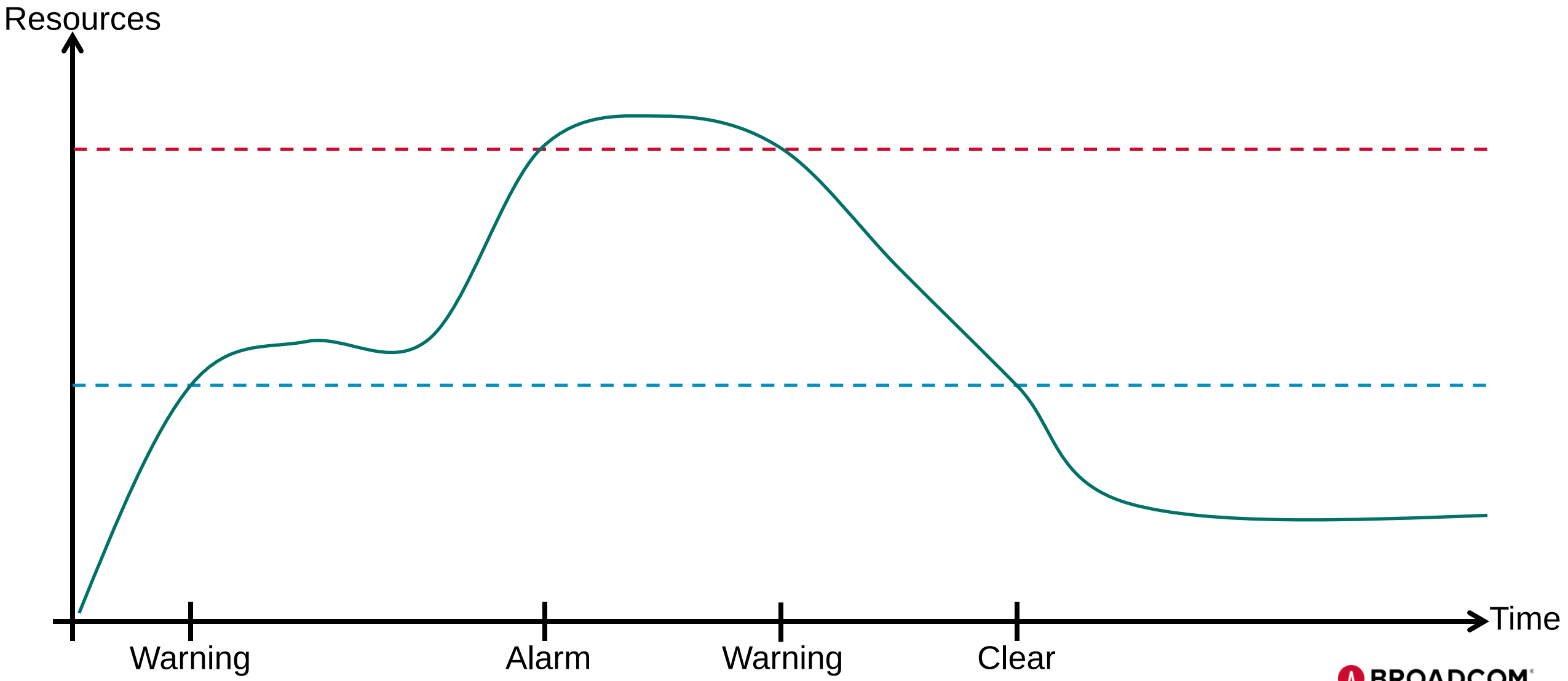
CDC Descriptor
Transmit Signal capability
Transmit Signal frequency
Receive Signal capability
Receive Signal frequency

Signal Capability
0 = Congestion primitive signal is not supported 1 = Warning primitive signal is supported 2 = Both primitive signals are supported

Signal Frequency
Transmission/Detection Cycle (1-999)
Transmission/Detection Scale (sec, ms, us, ns, etc)

Signal Behavior

Transitions



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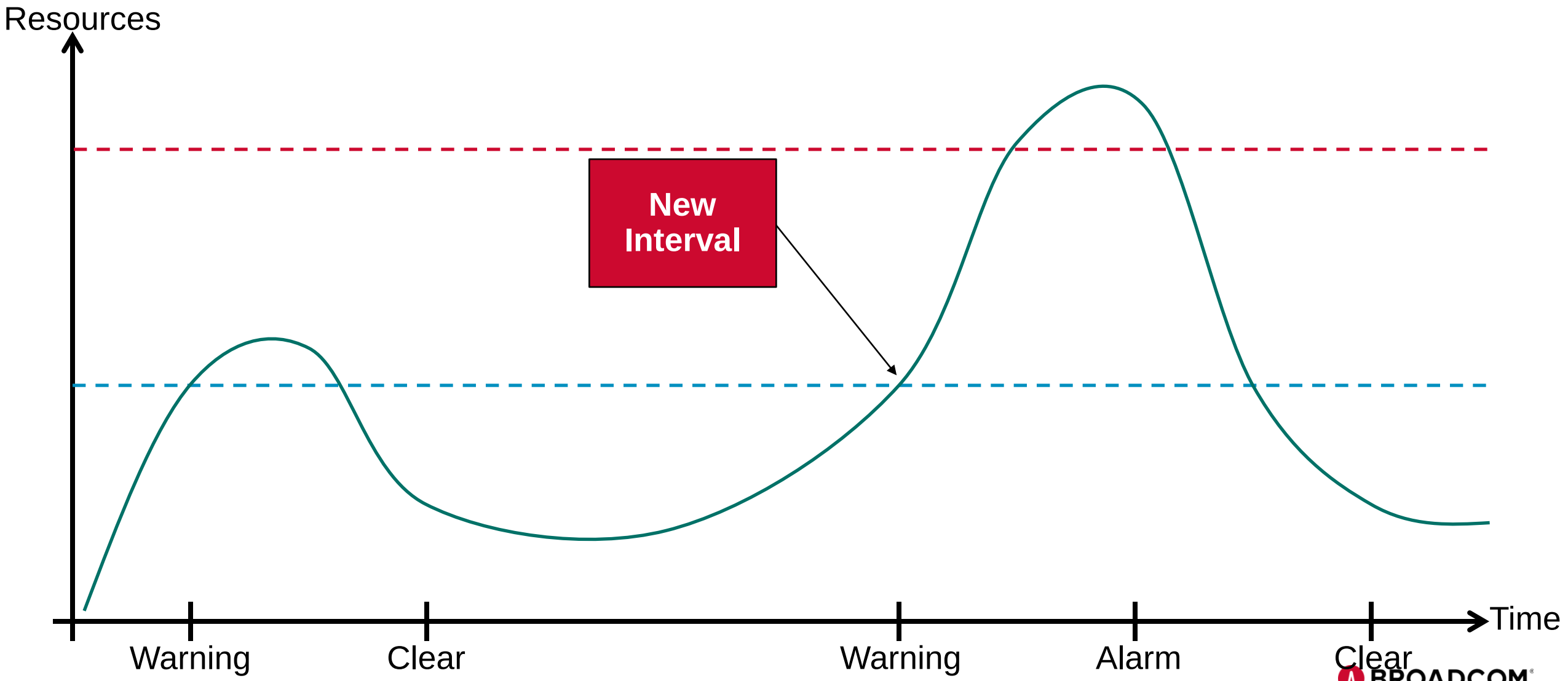
Signal Behavior

Triggers



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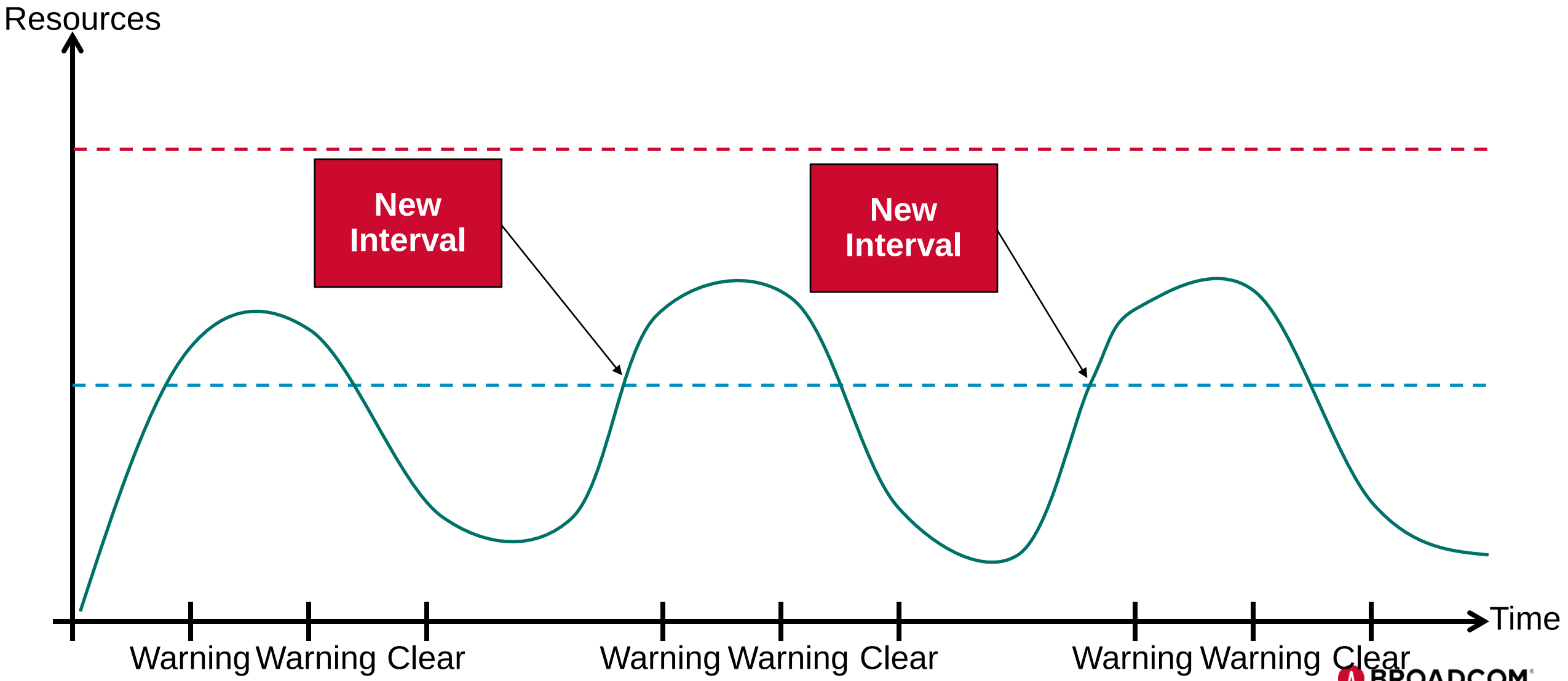
Signal Behavior

Small intervals



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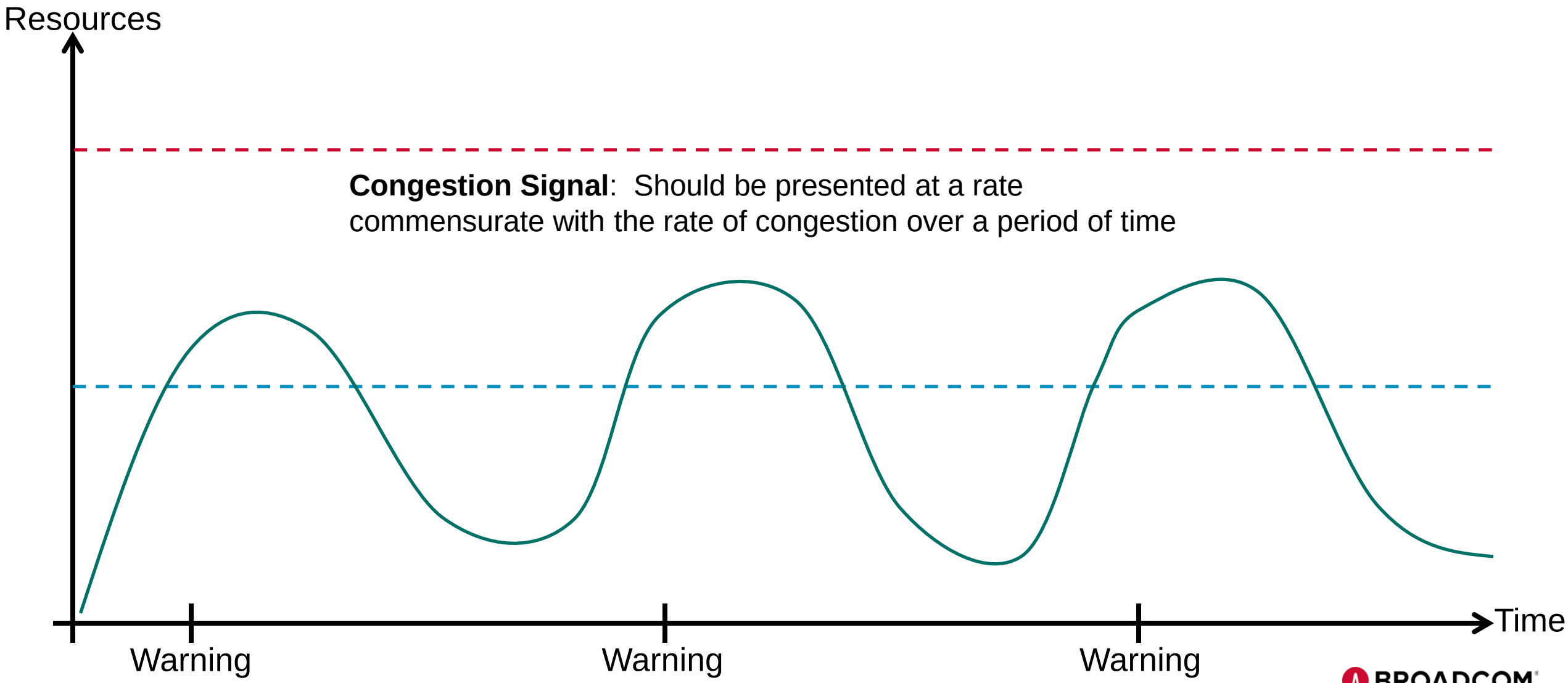
Signal Behavior

Large intervals



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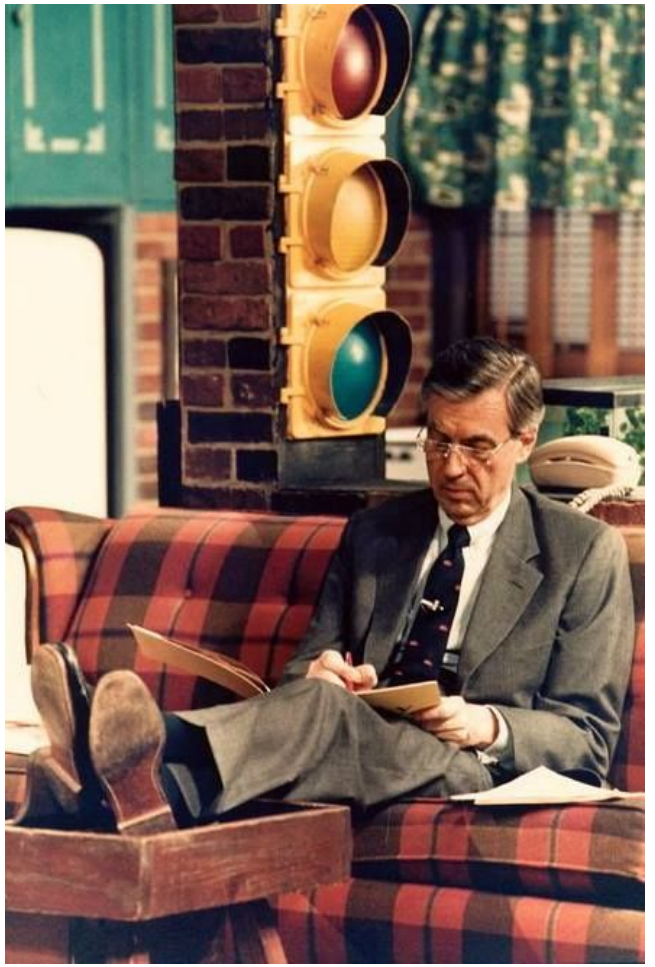
Signal Behavior

Notes

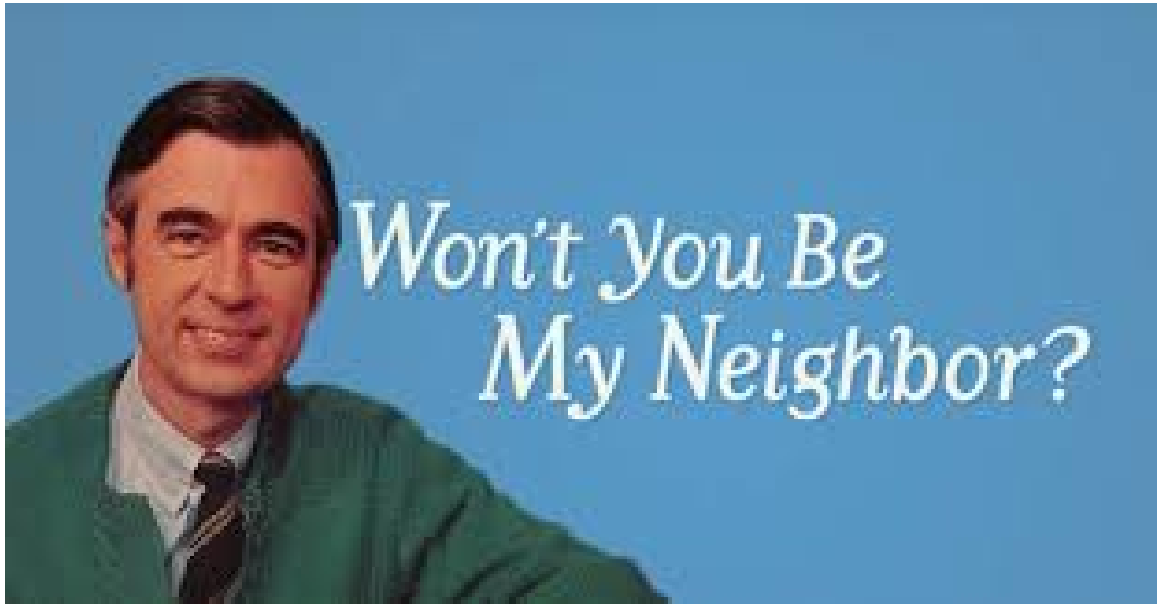
- Congestion Signal
  - Presented at a rate commensurate with the rate of congestion over a period of time



Motion

Fabric Notifications

- Move to incorporate T11-2019-00215-v002 into FC-FS-6



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References

Notes from August 2019 Meeting

(2019-00083-v001)

Draft Text Summary

Definitions

- 5.2.7.3 8B/10B Primitive Signals – Table 8
  - Add definitions for ARB(F1) and ARB(F7)

Description	Primitive	Byte-1	Byte-2	Byte-3	Byte-4
Warning	ARB(F1)	K28.5	D20.4	D17.7	D17.7
Alarm	ARB(F7)	K28.5	D20.4	D23.7	D23.7

- 25 Congestion Signal
  - Add new clause defining Congestion Signals

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Draft Text Notes

Early Feedback (new in v001)

- 25 Congestion Signal
  - Changed “Congest Signal” to “Congestion Signal”
- 25.2 Definition
  - Incorporated Table 105 into Table 8
- 25.2.1 Transmission and Processing
  - Removed Table 106 (and reference to it)
- 25.3.1 Warning Congestion Signal
  - Added:
    - The transmission rate of the Warning Congestion Signal is determined during the EDC exchange between the two ports of the link (see FC-LS-5).
- 25.3.2 Alarm Congestion Signal
  - Added:
    - The transmission rate of the Alarm Congestion Signal is determined during the EDC exchange between the two ports of the link (see FC-LS-5).

CDC Descriptor
Transmit Signal capability
Transmit Signal frequency
Receive Signal capability
Receive Signal frequency

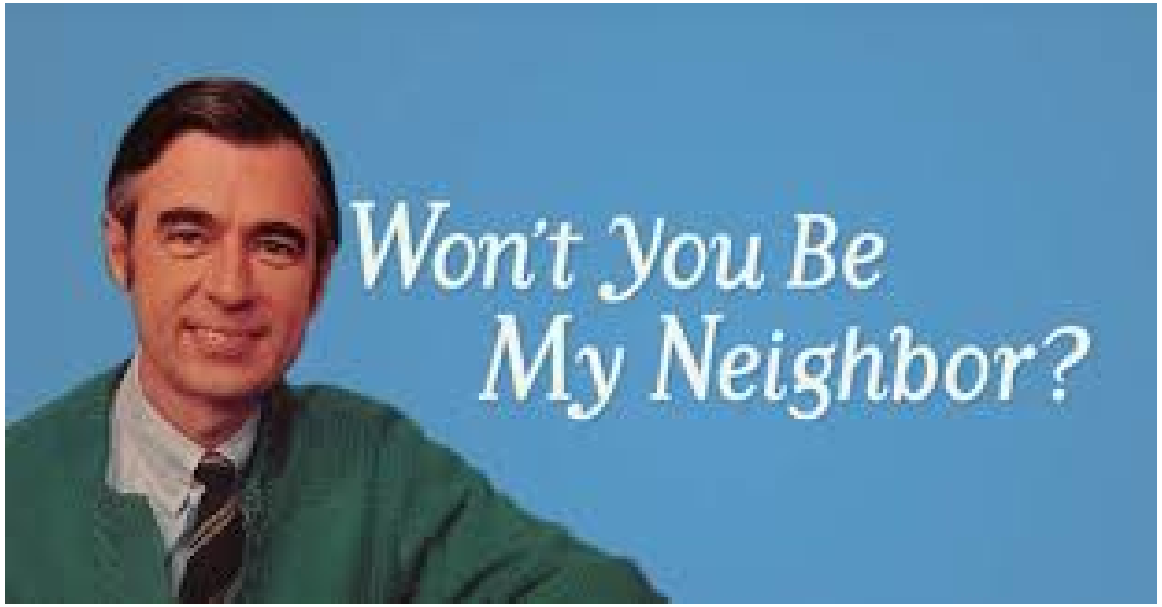
Signal Capability
0 = Congestion primitive signal is not supported 1 = Warning primitive signal is supported 2 = Both primitive signals are supported

Signal Frequency
Transmission/Detection Cycle (1-999)
Transmission/Detection Scale (sec, ms, us, ns, etc)

Motion

Fabric Notifications

- Move to incorporate T11-2019-00215-v001 into FC-FS-6



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References

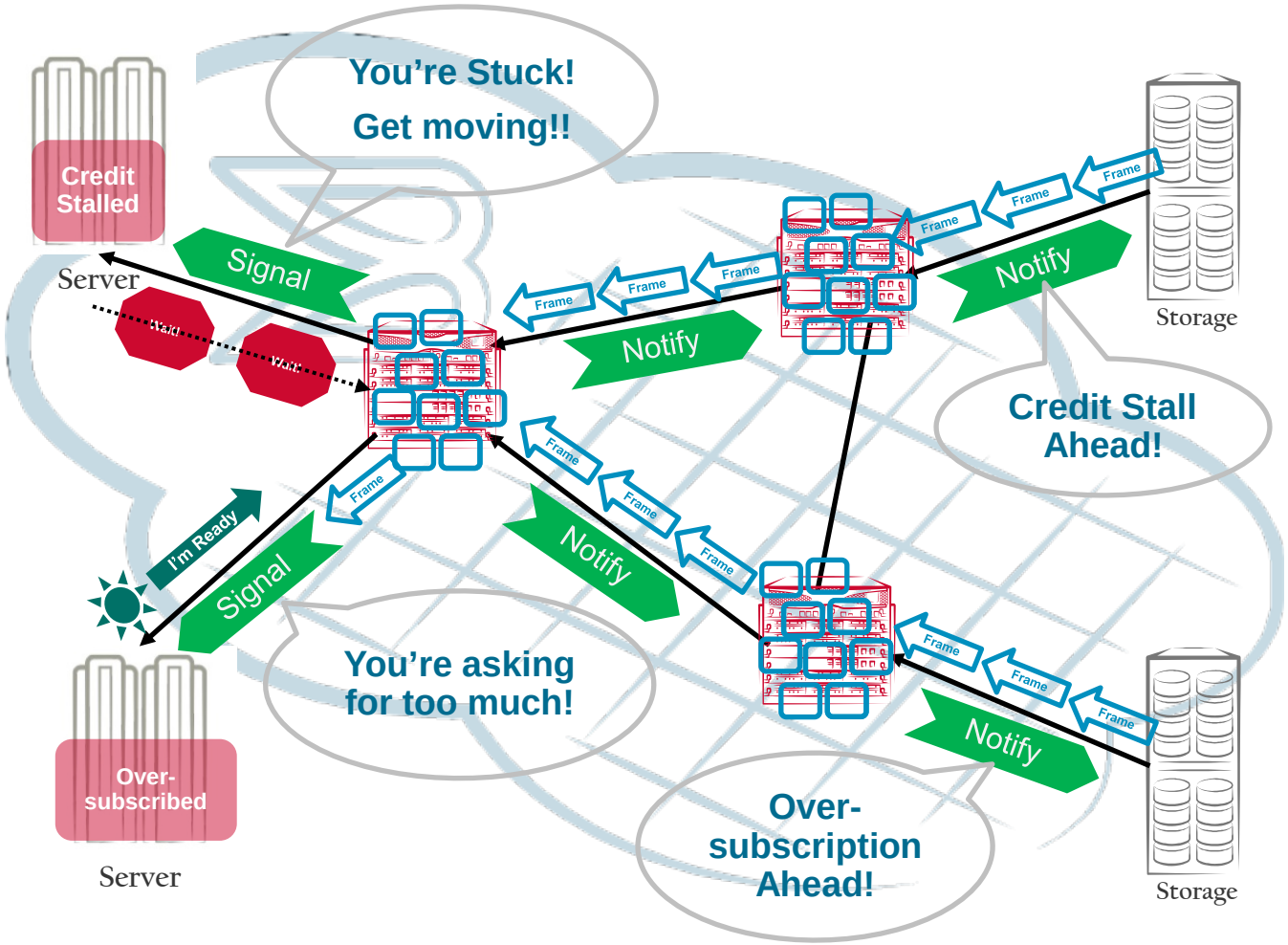
Notes from June 2019 Meeting

(2019-00083-v000)

Fabric Notifications

Inform devices about issues in the Fabric

- What works?
  - Buffer Credit Recovery (see FC-FS-4)
- What else is needed?
  - A method to surface transport issues
- Let's "mimic" existing behavior
  - Devices register for notifications
  - Fabric reports events/problems
    - E.g., link integrity, congestion, delivery failure, frame drop, etc
- Goal
  - Leverage what the Fabric knows



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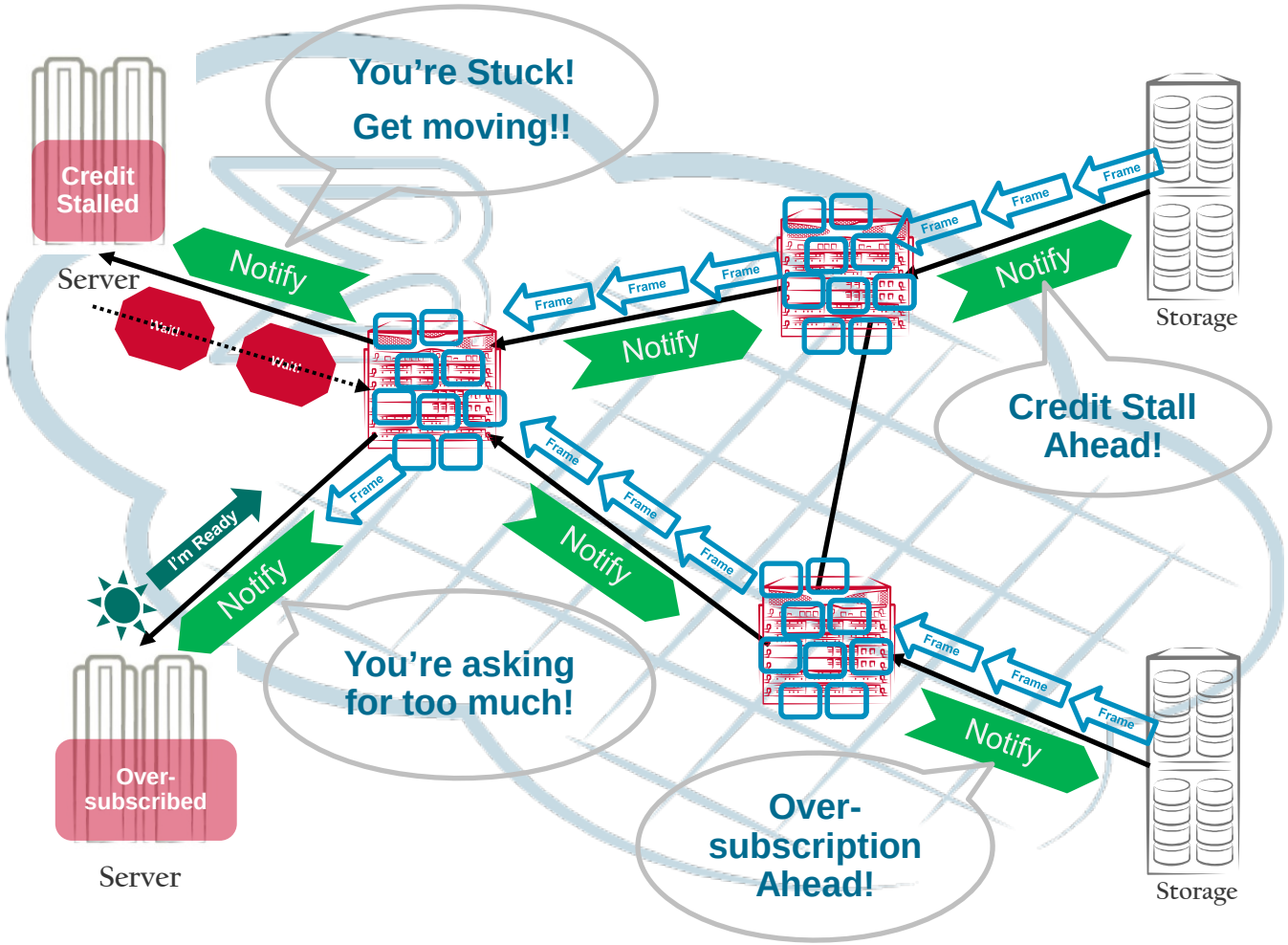
Fabric Notifications

The Fabric can help

- Notifications
  - Tell us when the road is bad
    - Link Integrity notification
  - Tell us when we lost a package
    - Delivery notification
  - Tell our friends when we're not eating our broccoli, peas, carrots, and "frames"
    - Peer Congestion notification
  - Tell us we need to eat our broccoli, peas, carrots, and "frames"
    - Congestion notification
- Congestion Notifications
  - Tell us when there are lots of frames waiting for us (warning)
  - Tell us when the waiting frames are spilling onto the neighbors lawn (alarm)
- Sometimes it's hard to notify us
  - Let's send a help Signal



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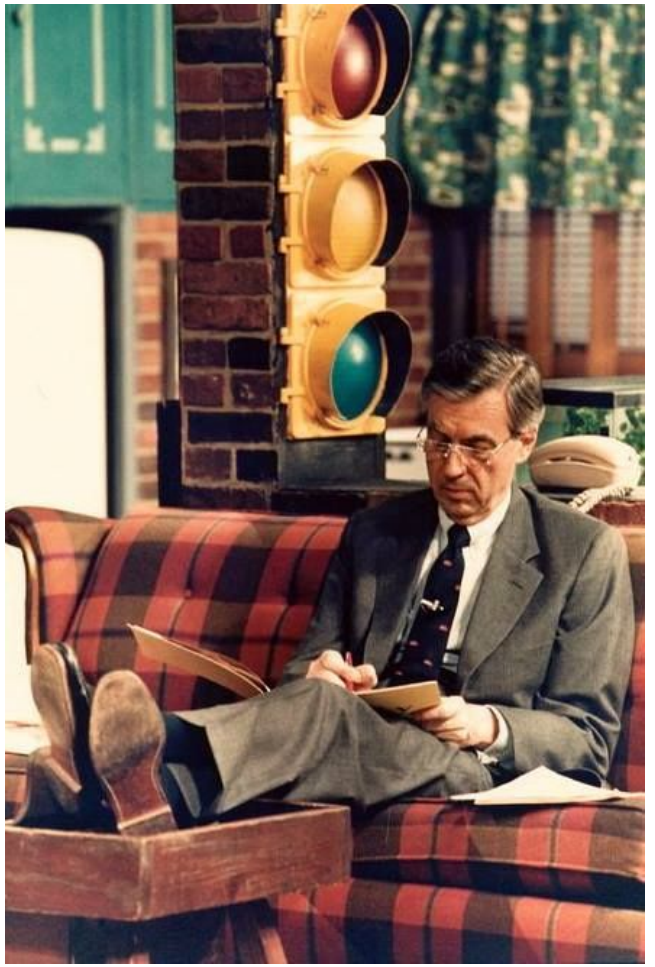
Fabric Notifications

Signals working

- Two signals
  - Warning and Alarm
- Transmitter generates the Signal
  - Alerts receiver when frames are backing up
    - Warning == low water mark
    - Alarm == high water mark
  - Persists while above Warning level
- Receiver detects the Signal
  - Signal provides notification that a change in behavior is desired
  - Receiver modifies behavior to alleviate the condition



Fabric Notifications

Definitions

- Signals are ARB primitives
  - Allows us to “drill thru” credit stall
  - Use F1 for warning and F7 for alarm
- Transmission
  - Preceded and succeeded by two fill words
  - Non-disruptive to older devices
  - Usable at all supported speeds
  - Processing occurs after PCS/FEC
- Encoding
  - Cannot be added or deleted for alignment marker insertion and rate compensation
  - Transmission occurs between IDLEs
    - Treated as an “Other Special Function”
    - E.g. IDLE, IDLE, ARB(F1), IDLE

Description	Primitive	Byte-1	Byte-2	Byte-3	Byte-4
Warning	ARB(F1)	K28.5	D20.4	D17.7	D17.7
Alarm	ARB(F7)	K28.5	D20.4	D23.7	D23.7

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Fabric Notifications

Exchange Diagnostics Capabilities

- Add Congestion Detection Capabilities
  - New TLV descriptor for EDC ELS
- Signals description
  - Ability to transmit and receive
    - Not supported
    - Warning only
    - Both
  - Frequency of transmission or detection
    - Number of cycles (1-999)
    - Scale of cycles (I.e., seconds, milliseconds, microseconds, nanoseconds, etc)

CDC Descriptor
Transmit Signal capability
Transmit Signal frequency
Receive Signal capability
Receive Signal frequency

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Transmission/Detection Scale (sec, ms, us, ns, etc)

Fabric Notifications

Exchange Diagnostics Capabilities

- Add Congestion Detection Capabilities
  - New TLV descriptor for EDC ELS

- Signals description
  - Ability to transmit
    - Not supported, Warning only, or Both
    - Frequency of transmission
      - Number of cycles (1-999)
      - Scale of cycles (I.e., seconds, milliseconds, microseconds, nanoseconds, etc)
  - Ability to receive
    - Not supported, Warning only, or Both
    - Frequency of detection
      - Number of cycles (1-999)
      - Scale of cycles (I.e., seconds, milliseconds, microseconds, nanoseconds, etc)

UPDATED

CDC Descriptor
Transmit Signal capability
Transmit Signal frequency
Receive Signal capability
Receive Signal frequency

Signal Capability
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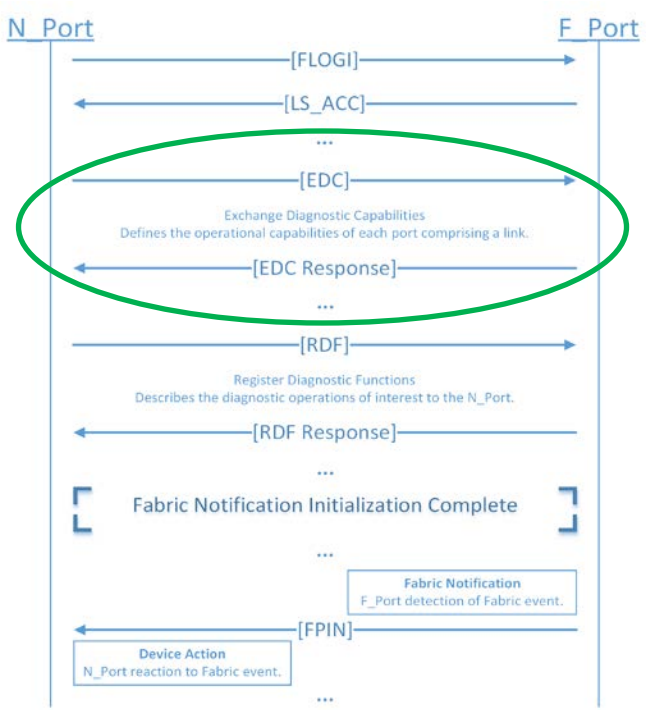
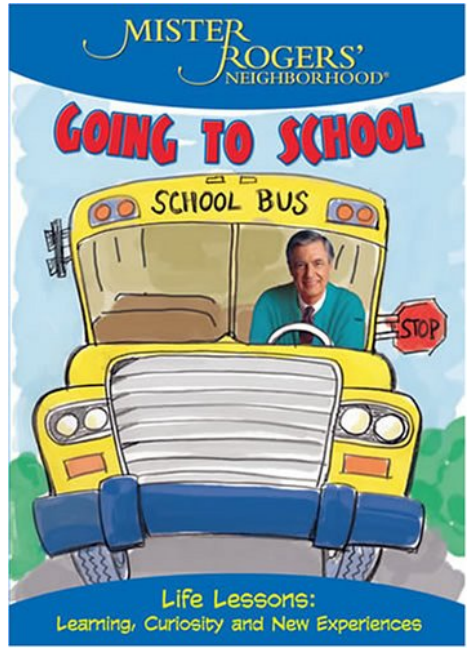
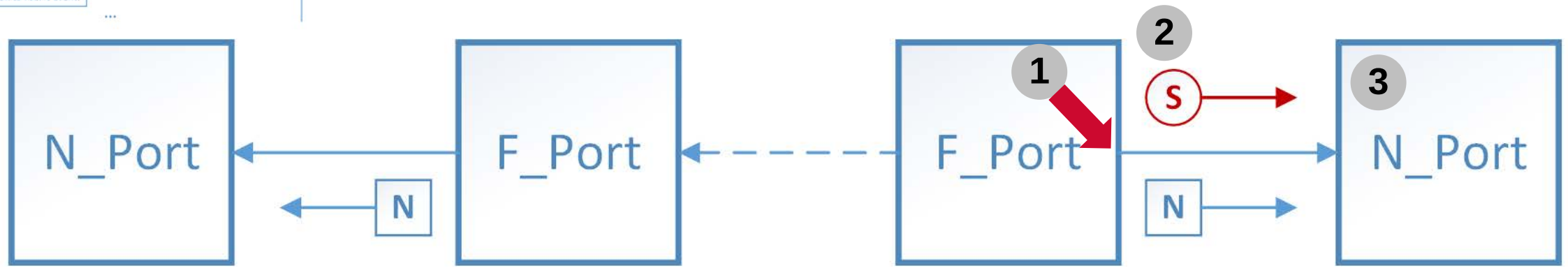
Signal Frequency
Transmission/Detection Cycle (1-999)
Transmission/Detection Scale (sec, ms, us, ns, etc)

Fabric Notifications – Signal example



1. F_Port detects a latency condition at the N_Port
2. A signal is generated
   - I.e. Warning/Alarm depending on the severity
3. N_Port modifies behavior to alleviate condition





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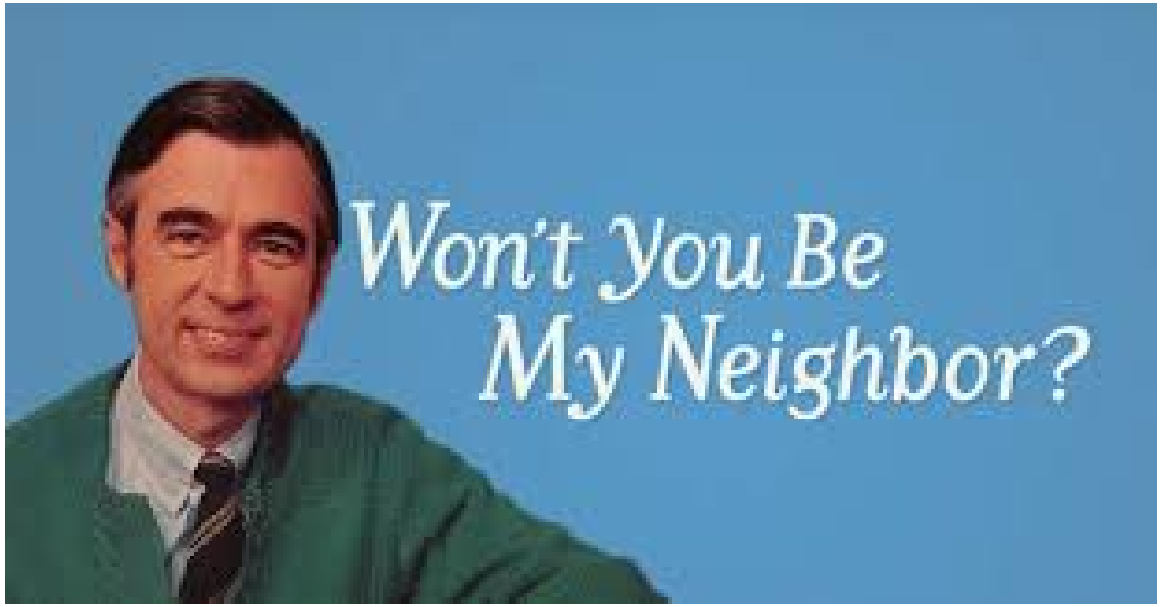
Fabric Notifications

Summary

- Purpose
  - Immediate response to congesting conditions
- Definition
  - Primitives for Warning and Alarm levels
- Operation
  - Exchange transmit/detection values in EDC



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Thank you