GraCaSI

-Tutorial-
What are the functional requirements for monitoring media to support CSMA/CD?

P802.3cg TF Interim Mtg
Spokane, WA September, 2018

Geoff Thompson
GraCaSI S.A./Independent

Some Background

GraCaSI

1) Requirements are rooted in coax, both “Experimental Ethernet”, DIX specification, IEEE Std 802.3 10BASE5/10BASE2 (i.e. “mixing segments”)

2) Extended (on a simplified basis) to “link segments” e.g. FOIRL, 10BASE-T, 100BASE-T...

3) THEN full-duplex transceivers derived for link segments from CSMA/CD transceiver (not the other way around) by
   a) Ignoring Collision_Detect
   b) Opening/ignoring loopback

   i.e. There are NO requirements to functional requirements for monitoring the medium. We haven't done CSMA/CD Half-duplex in 802.3 for quite awhile.

802.3 Definitions for reference

GraCaSI

Link Segment: 1.4.255: The point-to-point full-duplex medium connection between two and only two Medium Dependent Interfaces (MDIs).

Mixing Segment: 1.4.332: A medium that may be connected to more than two Medium Dependent Interfaces (MDIs).

The Requirement:

GraCaSI

CSMA/CD requires that a transmitter detect:

- Signal presence on media when transmitting (i.e. self)
- Signal presence on media when NOT transmitting
- Collision on media when transmitting (i.e. self + else)
- Collision on media when NOT transmitting (RMCD)

This is easy when:

- You are the only one transmitter (clean data)
- There is only 1 remote transceiver (pretty clean data)

Detection exits the clean data domain when:

- There is >1 transmitter but you are a participant (still easy)
- There is >1 transmitter but NOT your transmitter
  (Can't do it in the data domain)

How good does it have to be? (1):

GraCaSI

CSMA/CD requires that a transmitter detect:

- Signal presence on media when transmitting (i.e. self)
- Signal presence on media when NOT transmitting
- Collision on media when transmitting (i.e. self + else)

Well, what happens if it doesn't work that way?

- Signal presence on media when NOT transmitting

This one is easy because once upon a time an early Ethernet company (not one I worked for) built a fiber link for repeaters that couldn't tell the difference between a no signal and a disconnected fiber. Open RCV fiber = (1) No CS, (2) No CD
RESULT: Unregulated random collisions, early and late. (Early testing was so terrible it still looked like it worked.)
SOLUTION: Active idle, LinkBeat

How good does it have to be? (2):

GraCaSI

CSMA/CD requires that a transmitter detect:

- Signal presence on media when transmitting (i.e. self)
- Signal presence on media when NOT transmitting
- Collision on media when transmitting (i.e. self + else)

Well, what happens if it doesn't work that way?

- Collision on media when transmitting (i.e. self + else)

Light load conditions: You can “get away with it” a lot of the time. You are depending entirely on upper level protocols for error detection and retransmission.

Heavy load conditions: Most packets will have CRC errors, Late_Collision counters will count everywhere on the net.

How good does it have to be? (3):

Ethernet (both CSMA/CD & Full Duplex) built its reputation on reliable, error-free delivery.

If you got it out the transmitting MAC you could pretty much believe that it was received correctly.

BUT in the good old days of a) suspicion of networks, b) no great rush to deliver the data, higher layer protocols double checked on things. E.g. TCP/IP, FTP.

OTHER stuff worked well enough that folks started to depend Upon it. E.g. UDP, broadcast in general, time sensitive.

The END

GraCaSI
Standards Advisors

Geoffrey O. Thompson
Principal

Mountain View, CA 94043
USA

Phone: +1.540.227.0059
E-mail: <thompson@ieee.org>

The END

The END