Source Routing Encapsulation

Presented by George Duane
as a recommendation from 802.5
to IEEE 802.1Q

Goal of Presentation

- To allow all Token Ring and FDDI Frame formats to be supported by the p802.1Q draft
  - Draft currently supports Transparent traffic through a CSMA/CD Encapsulated cloud
  - Source Routing endstations may not be supported through CSMA/CD Encapsulated cloud in many configurations

Outlined TR requirements

- At the January interim meeting six goals were outlined which in the committees estimation would create a workable TR solution using 802.1Q encapsulation
  1. TR *non-aware* station communication with an ETH *VLAN aware* station
  2. TR to TR *non-aware* communication across an ETH *VLAN aware* backbone

Outlined TR requirements (cont.)

3. TR *non-aware* station communication with an ETH *non-aware* station
4. TR to TR *non-aware* communication across an FDDI *VLAN aware* backbone
5. Passing Q tagged packets through an 802.1H

   E <-> E, T <-> E, T <-> T
6. TR to TR *non-aware* Source Routed communication across an ETH *VLAN aware* backbone

Purpose of this Proposal

- This proposal solves the problem of communication of TR to TR endstations across tagged ETH (2) and tagged FDDI (4)
- It provides communication between TR non-aware endstations and ETH VLAN aware Servers (1)
- It supports Source Routing in all configurations (6)

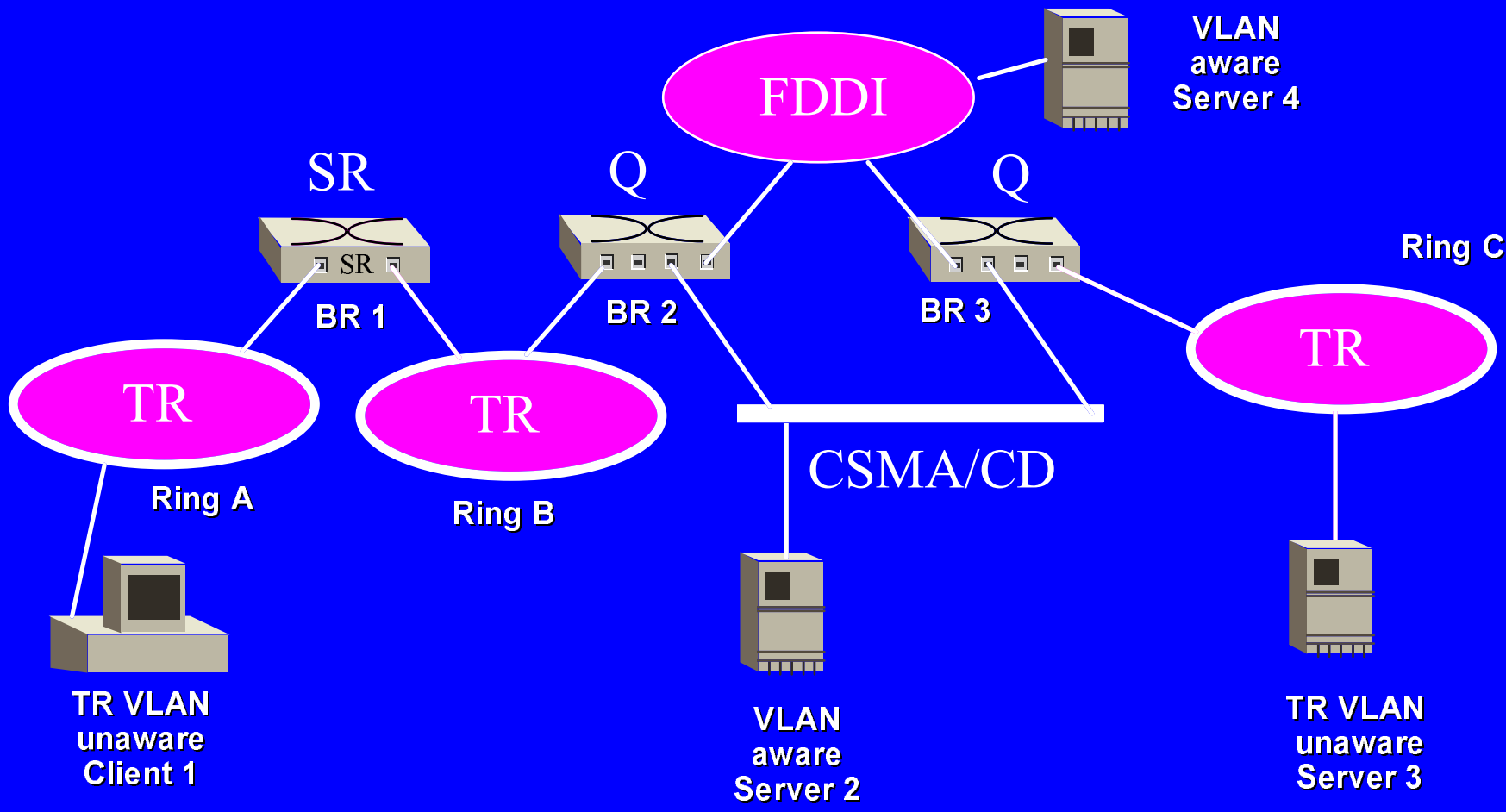
Additional Purposes

- It also allows communication of FDDI to FDDI *non-aware* endstations across tagged ETH using Source Routing (TR endstations may cause this)
- It also allows communication of TR *non-aware* endstations to FDDI *VLAN aware* Servers

Non-Goals

- This proposal does not address TR to ETH non-aware communication or packet formats through a .1H bridge (3 & 5)

Example Problem Configuration



Draft Breaks at SR Bridge

- The current Q draft removes any SR Routing Information (RIF) in a TR frame as it is encapsulated onto ETH
- When a frame is de-encapsulated there is no longer RIF to place in frame
- This new frame is not capable of being forwarded through SR bridges, common in TR environments

Example (Client 1/Server 3)

TR Client 1 initiates communication with Server 3. Ignoring what to do with Explorer frames, only a SR frame can pass through Bridge 1 and is seen at Bridge 2.

Bridge 2 encapsulates the TR frame into either ETH or FDDI frames and forwards to Bridge 3 without any RIF

Bridge 3 de-encapsulates frame and forwards to Server 3

Example (Server 3/ Client 1)

Server 3 replies with a Transparent TR frame

Bridge 3 encapsulates and Bridge 2 de-encapsulates the Transparent frame from ETH/FDDI

Since frame is Transparent it is dropped by SR Bridge 1

Communication is incomplete

- Client 1/Server 2 has equivalent problems

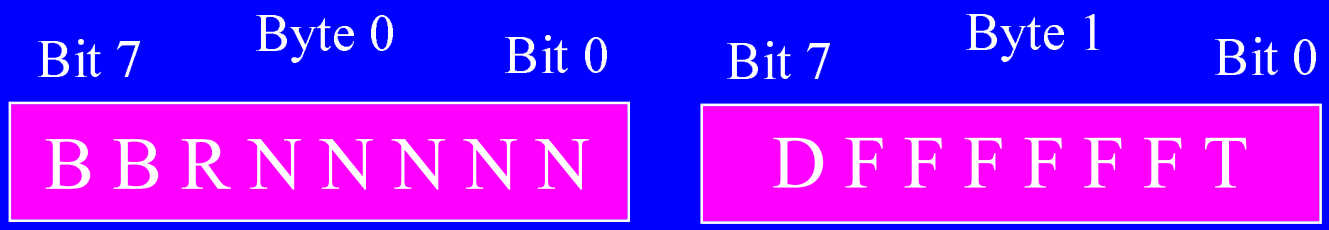
Is this a Problem? Yes!

- A large percentage of TR traffic is Source Routed (~50%)
- Many Mainframe based applications only support Source Routing, typical is SNA and NetBios
- Older SR only bridges often exist in these environments, and will continue to coexist with 802.1Q bridges in the near future

Format for TR/FDDI over 802.3

- DA field (6 octets)
- SA field (6 octets)
- TPID (2 octets)
- VID w/ RII set (2 octets)
- LEN (2 octets)
- **RCNTRL (2 octets)**
- **RDs (0 to 28 octets)**
- DATA (0 to 1496 octets)
- PAD (40 to 0 octets)
- FCS (4 octets)

Routing Control Field Def.



B = Broadcast Indicators

00 = Specifically Routed Frame, 01 = Transparent Frame

10 = All Routes Explorer, 11 = Single Route Explorer

N = Number of bytes in the RI. This value should be 0 for all transparent frames and 0..30 for all source routed

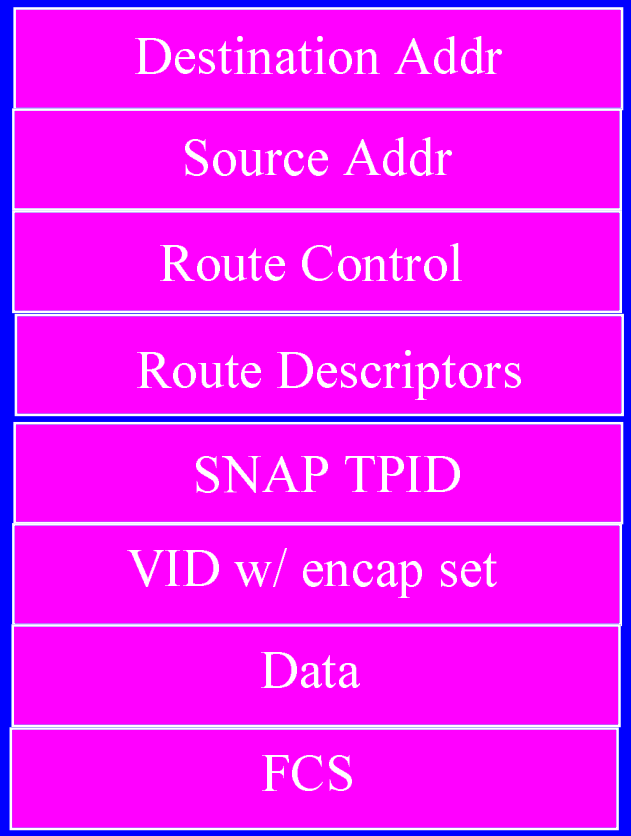
D = Direction indicator: F=0

F = Largest Frame size, set for both transparent and source routed frames

C = Canonical Address Indicator: 0= TR, 1=ETH/FDDI

R = Reserved

Format for Tags on TR/FDDI



- DA field (6 octets)
- SA field (6 octets)
- RCNTRL (2 octets)
- RDs (0 to 28 octets)
- SNAP TPID (8 octets)
- VID w/ non-Canonical Address Indicator (2 octets)
- DATA (0 to 18K/4.5K octet)
- FCS (4 octets)

Issues - Maximum Frame Size

- Transparent frame size is 1520 (1496 Data + 12 DA/SA + 4 Tag + 2 Len + 2 RCNTRL + 4 FCS)
- Source Routed frame is 1522 (1470 Data + 12 DA/SA + 4 Tag + 2 Len + 2 RCNTRL + 28 RDs + 4 FCS)

Issues - Ring Identifiers

- Forwarding decisions onto and off of the encapsulating cloud should be based on SR forwarding rules as defined in 802.1d
- To facilitate RIF parsing a unique identifier is required for each port supporting SR traffic, including the encapsulating port
- To simplify forwarding rules all encapsulating ports on the same cloud are assigned a common Virtual Ring Identifier

Conclusion

- This proposal for TR/FDDI encapsulation over ETH allows operation of all standard frame formats within the newly defined 802.1Q environment
- It provides support for the existing TR customer base while allowing the addition of capabilities such as high speed interconnection and VLAN support when needed