



***RPR Bridging - Packet Walkthroughs***

***Wai-Chau Hui - Nortel Networks***

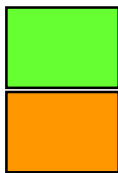
***Harry Peng - Nortel Networks***

***Constantinos Bassias – Lantern Communications***

# Agenda

- **Bridging solutions for 802.17 networks**
  - **Approaches**
    - Transparent Bridging
    - RPR Encapsulation Bridging
    - RPR Double Encapsulation Bridging
    - RPR Bridging with 802.3
  - **Issues**

## Packet Legend



Customer data Packet

RPR Header

**Higher Layer**  
(Bridge protocol, bridge management...)

**MAC Relay**  
(port state, FDB, learning  
forwarding process..)

**MAC**

**MAC**

## **Bridging Model**

### Note

- Aging of FDB are not included in these walkthroughs.

# 802.17 Network Scenarios

## 1. Transparent Bridging

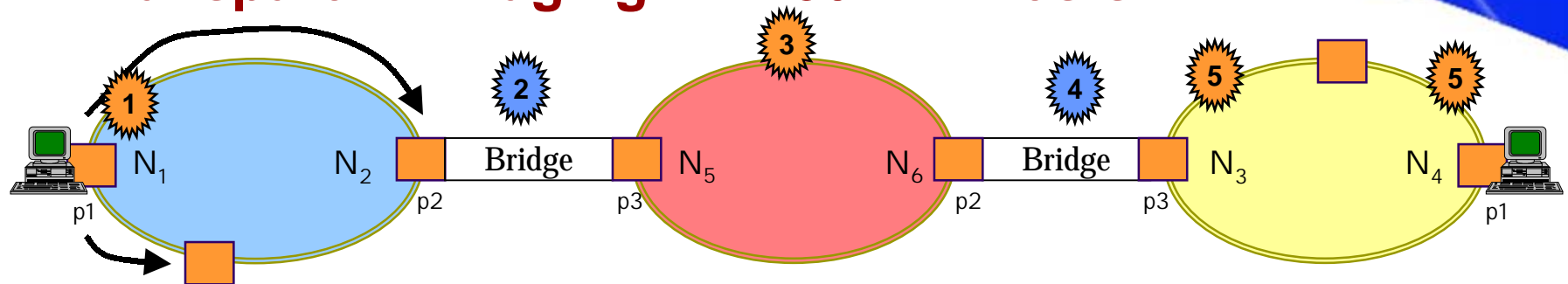
- Between 802.17 Hosts
- *Between 802.3 – 802.17 Hosts*

2. RPR Encapsulation Bridging

3. RPR Double Encapsulation Bridging

4. Bridging RPRs with 802.3

# Transparent Bridging with 802.17 Hosts - 1



N<sub>1</sub> UNI FDB

MAC	r/l
N1_P1	L

Bridge FDB

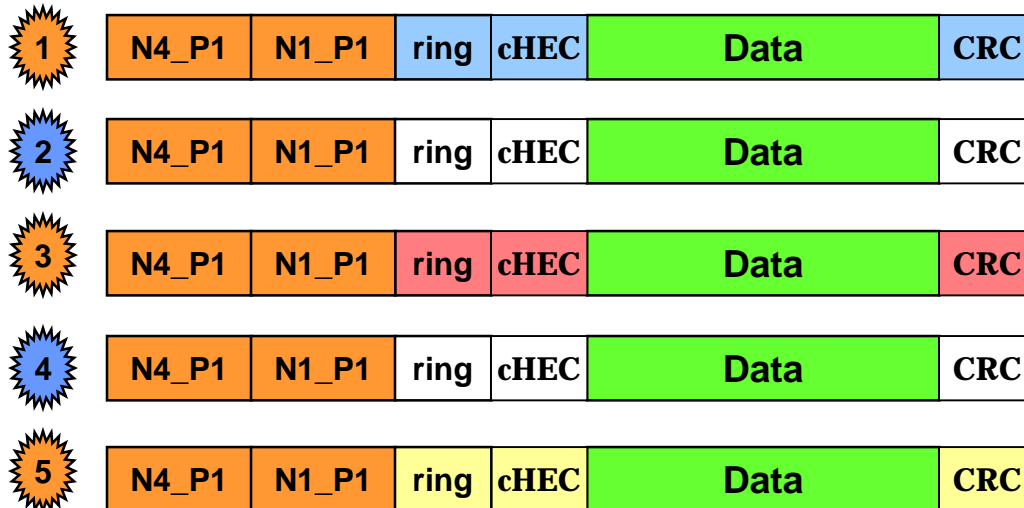
MAC	port
N1_P1	p2

Bridge FDB

MAC	port
N1_P1	p2

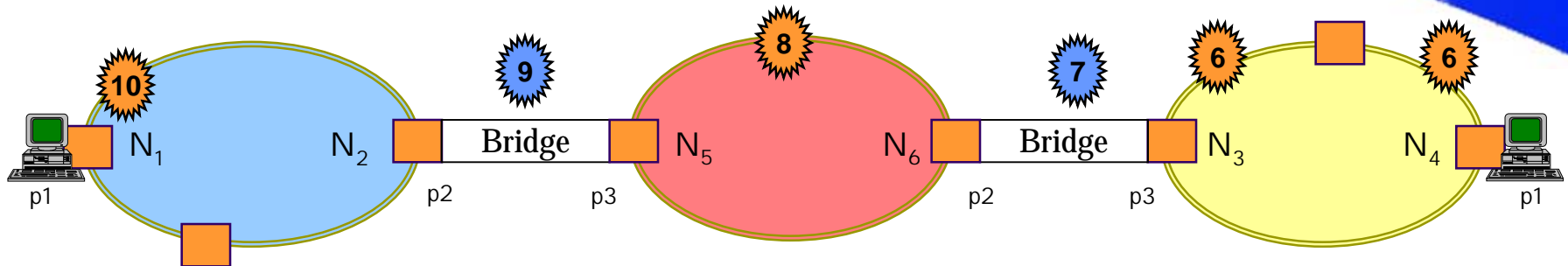
N<sub>4</sub> UNI FDB

MAC	r/l
N1_P1	R



ring = TTL, COS, Type...

# Transparent Bridging with 802.17 Hosts - 2



N<sub>1</sub> UNI FDB

MAC	r/l
N1_P1	L
N4_P1	R

Bridge FDB

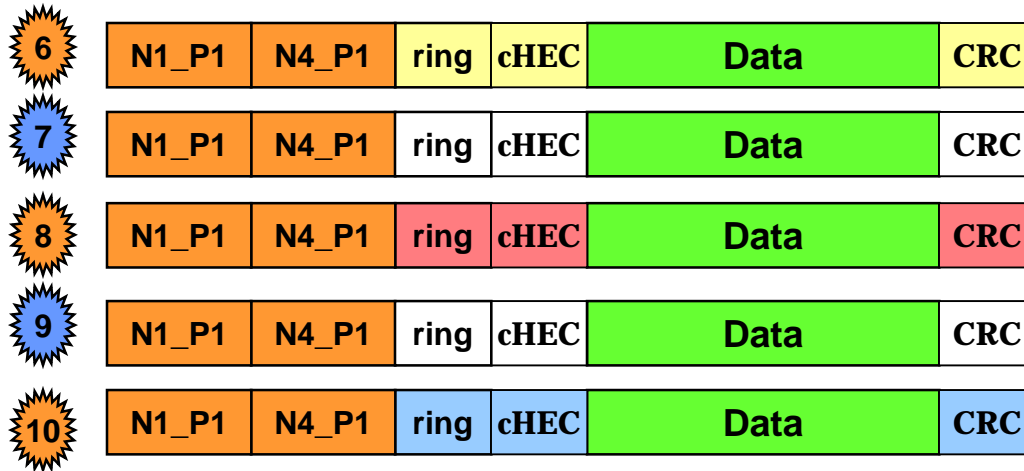
MAC	port
N1_P1	p2
N4_P1	p3

Bridge FDB

MAC	port
N1_P1	p2
N4_P1	p3

N<sub>4</sub> UNI FDB

MAC	r/l
N1_P1	R
N4_P1	L



## Transparent Bridging between 802.17 Hosts - Summary

- Bridge ports can run STP
- All Station MAC addresses will be in bridge FDB and needs ring speed processing
- CRC
  - Cannot cut-through and distinguish un-routable packet
  - Use cHEC
- No flooding on other ringlet ports

# 802.17 Network Scenarios

## 1. Transparent Bridging

- *Between 802.17 Hosts*
- *Between 802.3 – 802.17 Hosts*

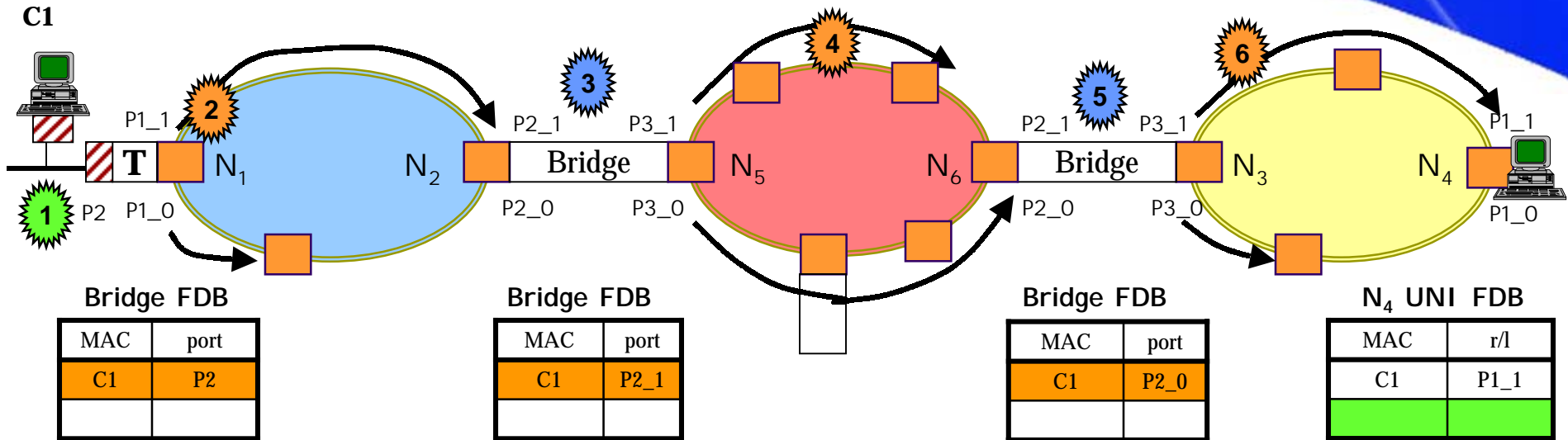
2. RPR Encapsulation Bridging

3. RPR Double Encapsulation Bridging

4. Bridging RPRs with 802.3



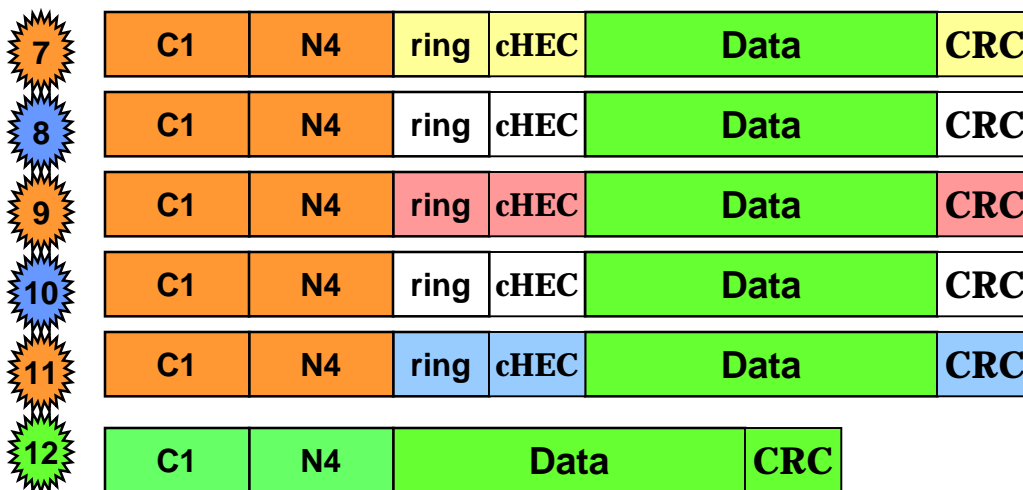
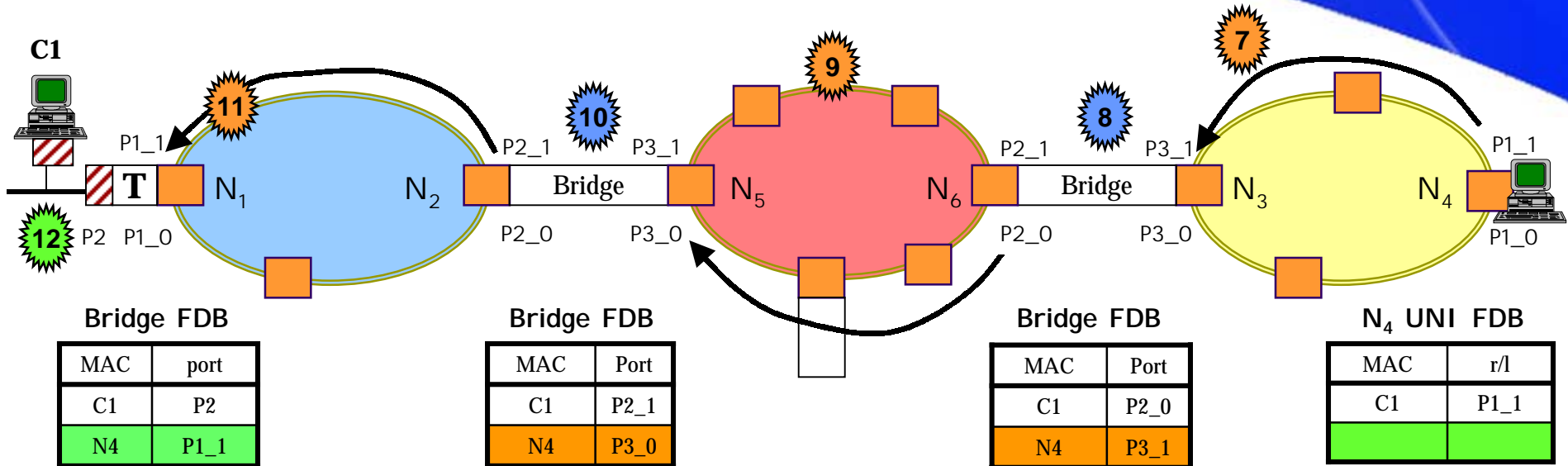
# Transparent Bridging Between 802.3/802.17 Hosts - 1



1	N4	C1		Data	CRC	
2	N4	C1	ring	cHEC	Data	CRC
3	N4	C1	ring	cHEC	Data	CRC
4	N4	C1	ring	cHEC	Data	CRC
5	N4	C1	ring	cHEC	Data	CRC
6	N4	C1	ring	cHEC	Data	CRC

**Floods by sending in both directions  
TTL stripping**

# Transparent Bridging Between 802.3/802.17 Hosts - 2



## Transparent Bridging Between 802.3/802.17 Hosts - Summary

- Bridge ports can run STP
- **All Host** MAC addresses will be in bridge FDB and needs ring speed processing
- **NOT SCALABLE** when connecting to many LAN segments.
- **CRC**
  - Cannot cut-through and distinguish un-routable packet
  - Use cHEC
- **No flooding on other ringlet ports**

## Transparent Bridging Between 802.3/802.17 Hosts – Summary Cont'd

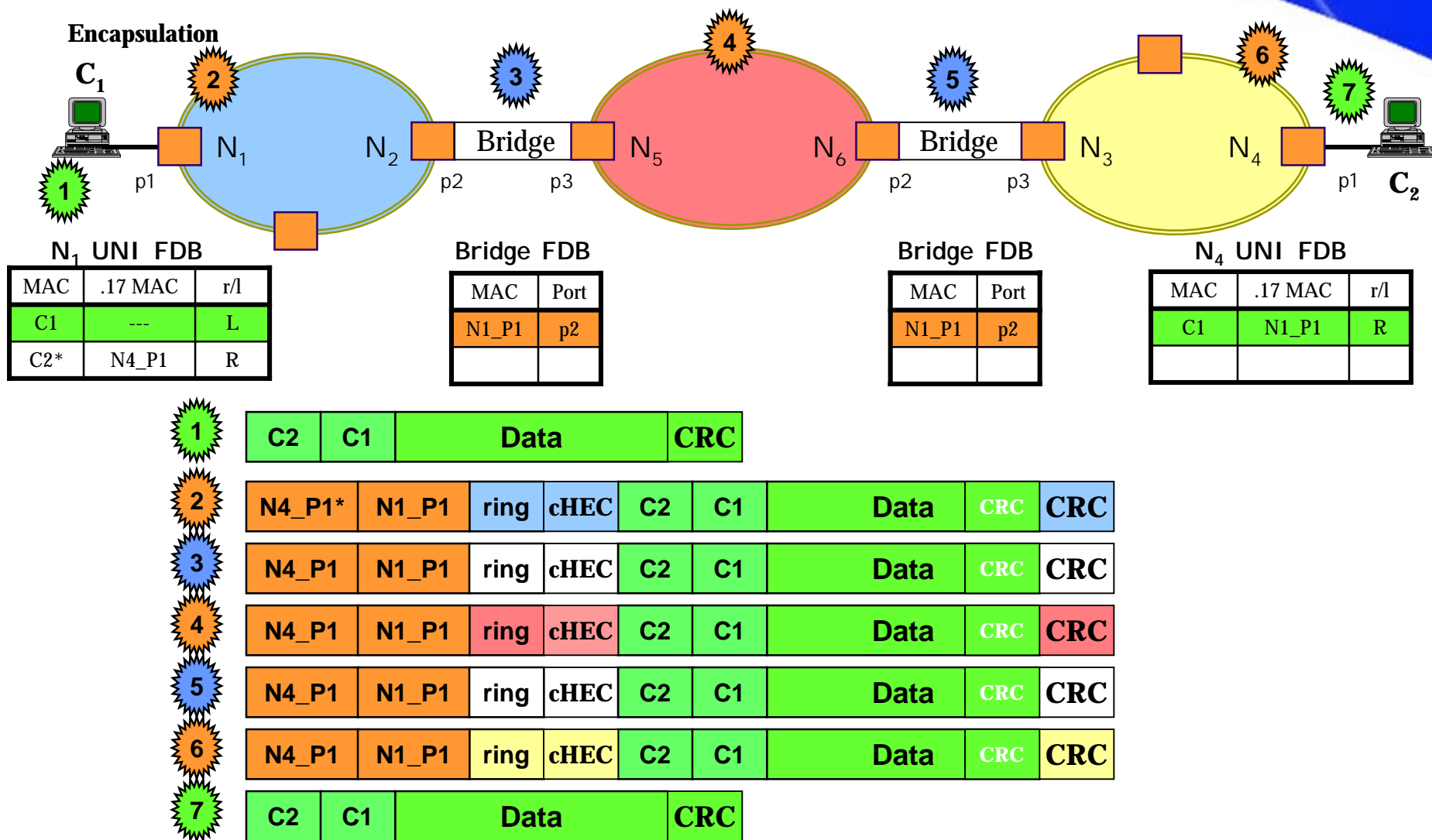
- **To address unknown unicast flooding problem\***
  - Flood unknown destination address packets by sending in both directions using TTL stripping
  - Requires MAC port assignment to identify ring ports

\*RPR and 802.1D bridging Issues - Yong Kim, May 2001.

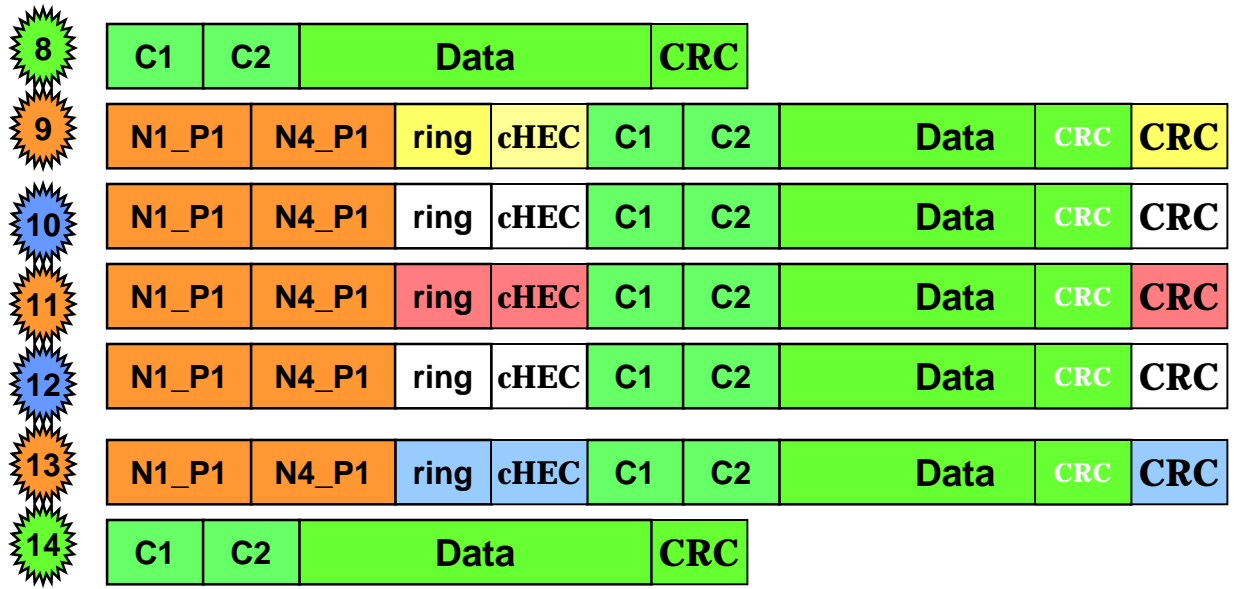
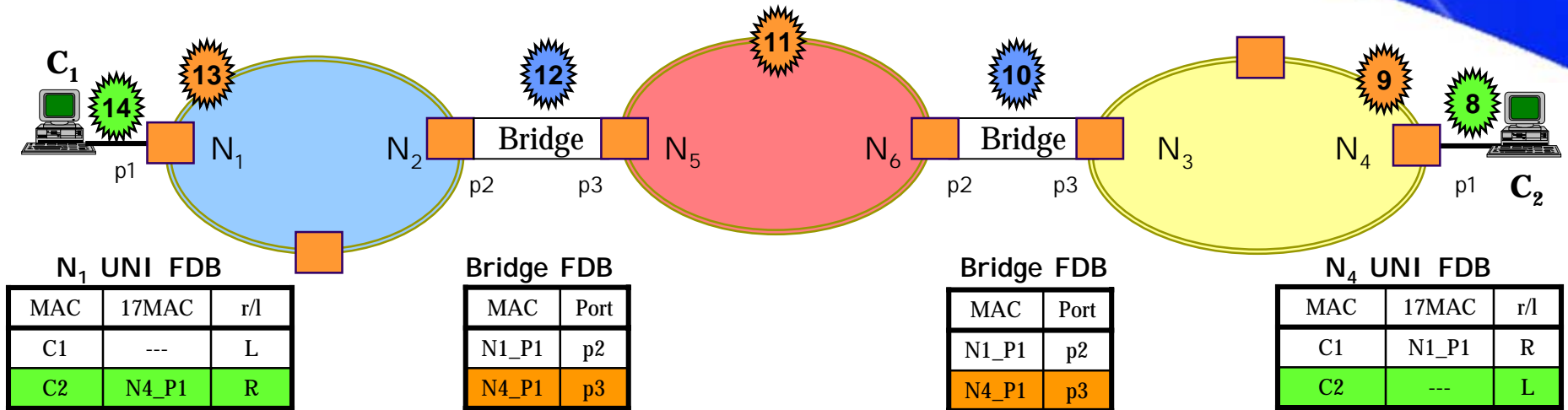
## 802.17 Network Scenarios

1. Transparent Bridging
- 2. RPR Encapsulation Bridging**
3. RPR Double Encapsulation Bridging
4. Bridging RPRs with 802.3

# RPR Encapsulation Bridging - 1



# RPR Encapsulation Bridging - 2



## RPR Encapsulation Bridging - Summary

- **Bridge ports can run STP**
  - Within encapsulation domain
- **All UNI Station MAC addresses will be in bridge FDB and needs ring speed processing**
  - More SCALABLE
  - All LAN segment MAC address is now represented by .17 MAC
- **CRC**
  - No longer transparent with ring specific fields: changing TTL
  - Use cHEC
- **No flooding on other ringlet ports**

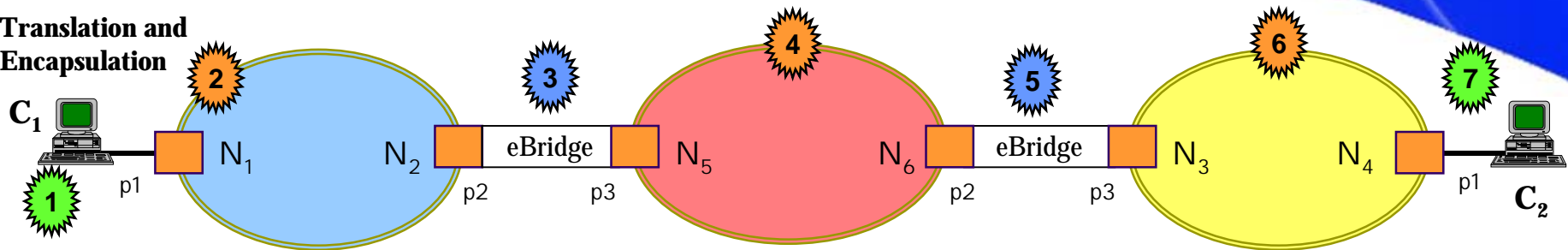


## 802.17 Network Scenarios

1. Transparent Bridging
2. RPR Encapsulation Bridging
- 3. *RPR Double Encapsulation Bridging***
4. Bridging RPRs with 802.3

# RPR Double Encapsulation Bridging - 1

Translation and Encapsulation



N<sub>1</sub> UNI FDB

MAC	.17MAC	NH	r/l
C1	---	---	L

Bridge XLT

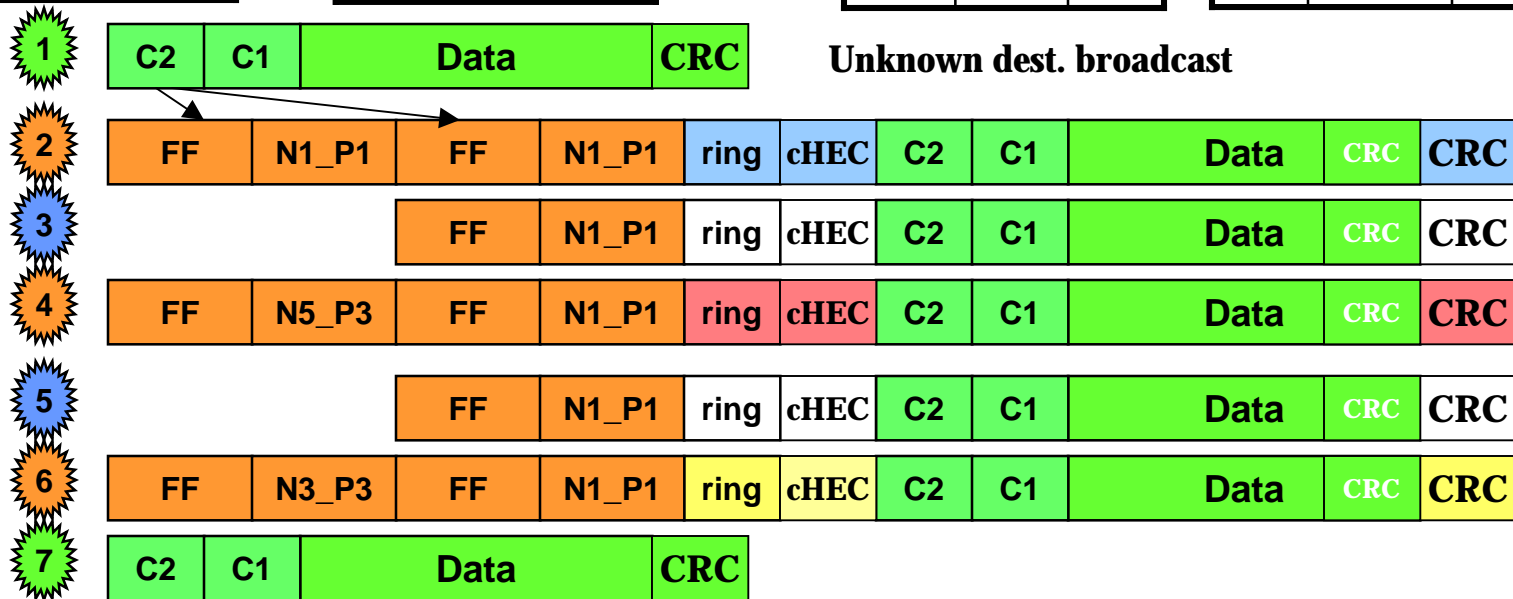
MAC	NH	port
N1_P1	N1_P1	p2

Bridge XLT

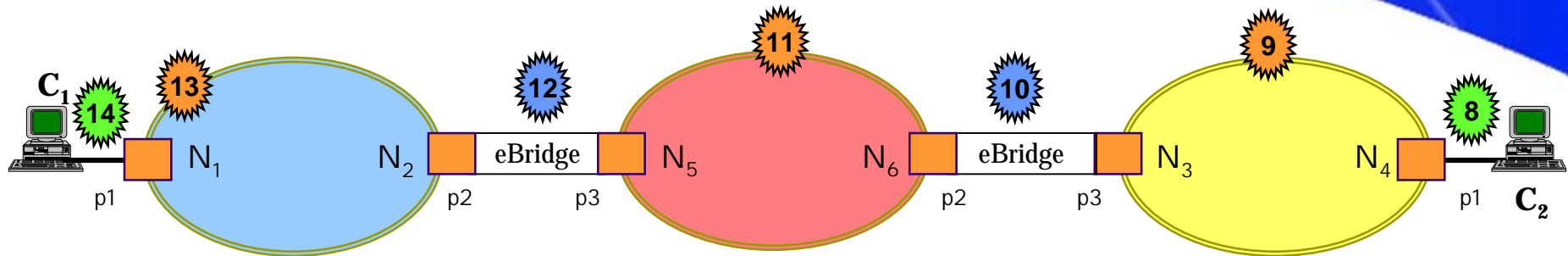
MAC	NH	port
N1_P1	N5_P3	p2

N<sub>4</sub> UNI FDB

MAC	.17MAC	NH	r/l
C1	N1_P1	N3_P3	R



# RPR Double Encapsulation Bridging - 2



N<sub>1</sub> UNI FDB

MAC	17MAC	.NH	R/I
C1	---	---	L
C2	N4_P1	N2_P2	R

Bridge Port XLT

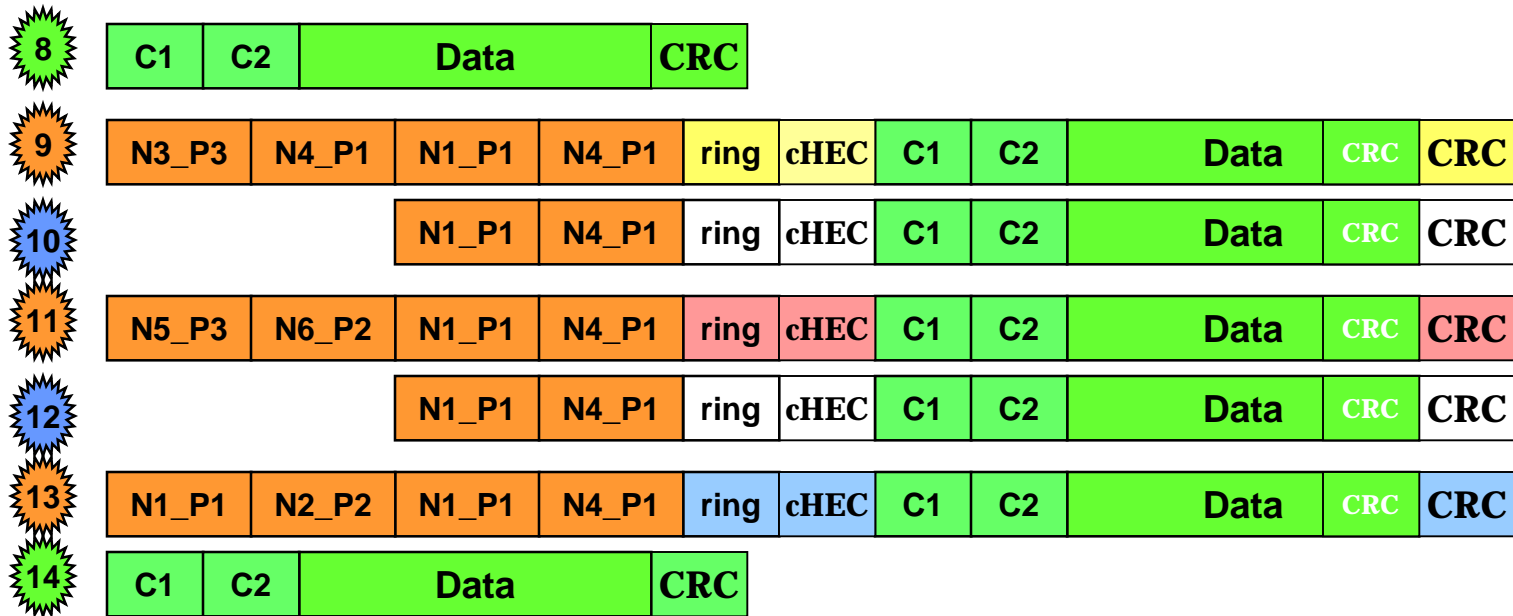
MAC	NH	Port
N1_P1	N1_P1	p2
N4_P1	N6_P2	p3

Bridge Port XLT

MAC	NH	Port
N1_P1	N5_P3	p2
N4_P1	N4_P1	p3

N<sub>4</sub> UNI FDB

MAC	17MAC	NH	r/I
C1	N1_P1	N3_P3	R
C2	---	---	L



## RPR Double Encapsulation Bridging - Summary

- **Bridge ports can run STP**
- **One Station MAC address at ring rate**
  - SCALABLE
  - Only bridge traffic is forwarded to MAC relay entity
    - Not promiscuous mode
- **Higher overhead**
- **Translational bridging is required**
- **No flooding on other ringlet ports**

## 802.17 Network Scenarios

1. Transparent Bridging
2. RPR Encapsulation Bridging
3. RPR Double Encapsulation Bridging
4. **Bridging RPRs with 802.3**

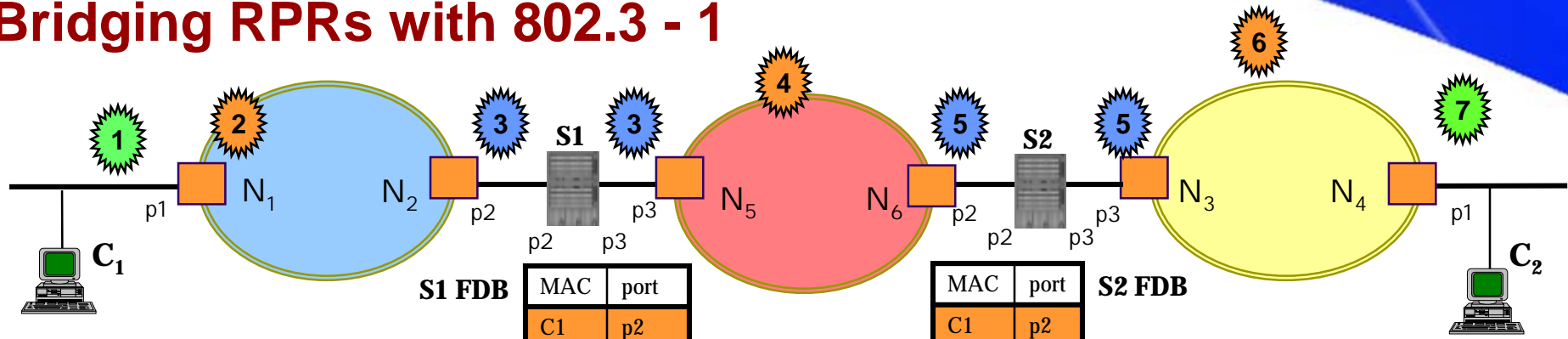
N5 UNI FDB

MAC	.17 MAC	r/l
C1	---	L

MAC	.17MAC	r/l
C1	N5_P3	R

N6 UNI FDB

# Bridging RPRs with 802.3 - 1



S1 FDB

MAC	port
C1	p2

MAC	port
C1	p2

S2 FDB

N<sub>1</sub> UNI FDB

MAC	17MAC	r/l
C1	---	L

N<sub>2</sub> UNI FDB

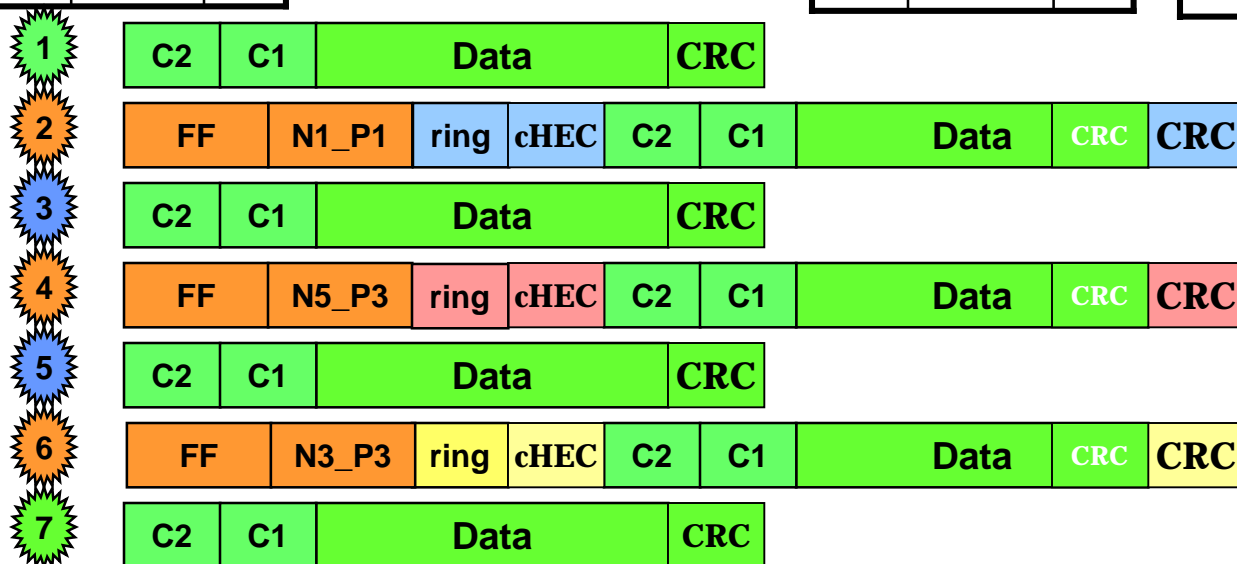
MAC	.17MAC	r/l
C1	N1_P1	R

N<sub>3</sub> UNI FDB

MAC	.17 MAC	r/l
C1	---	L

N<sub>4</sub> UNI FDB

MAC	17MAC	r/l
C1	N3_P3	R



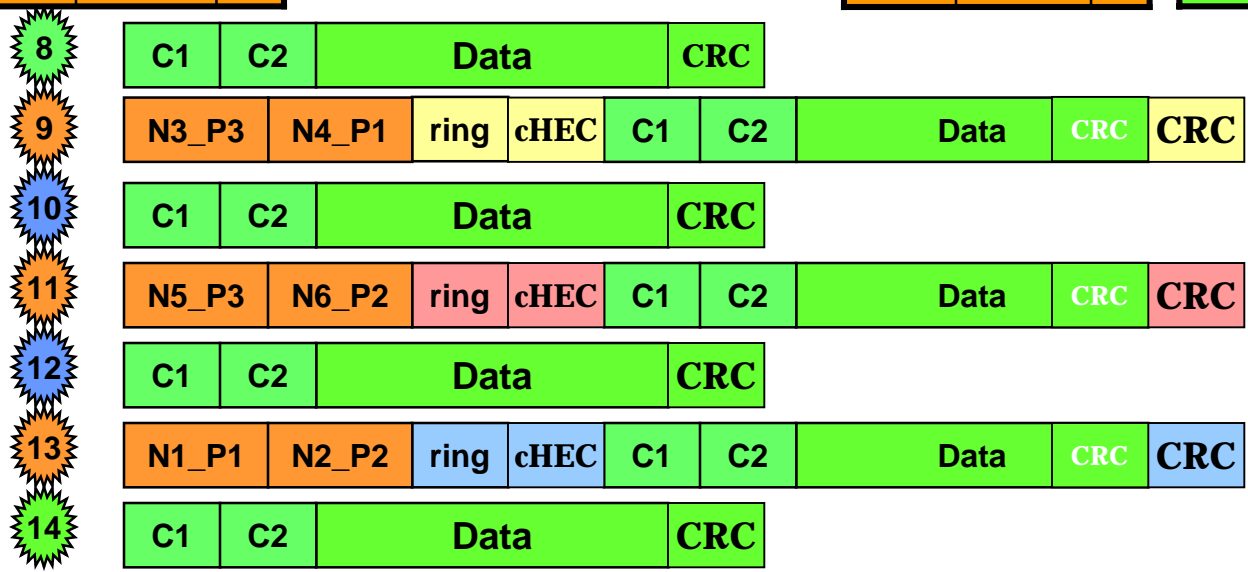
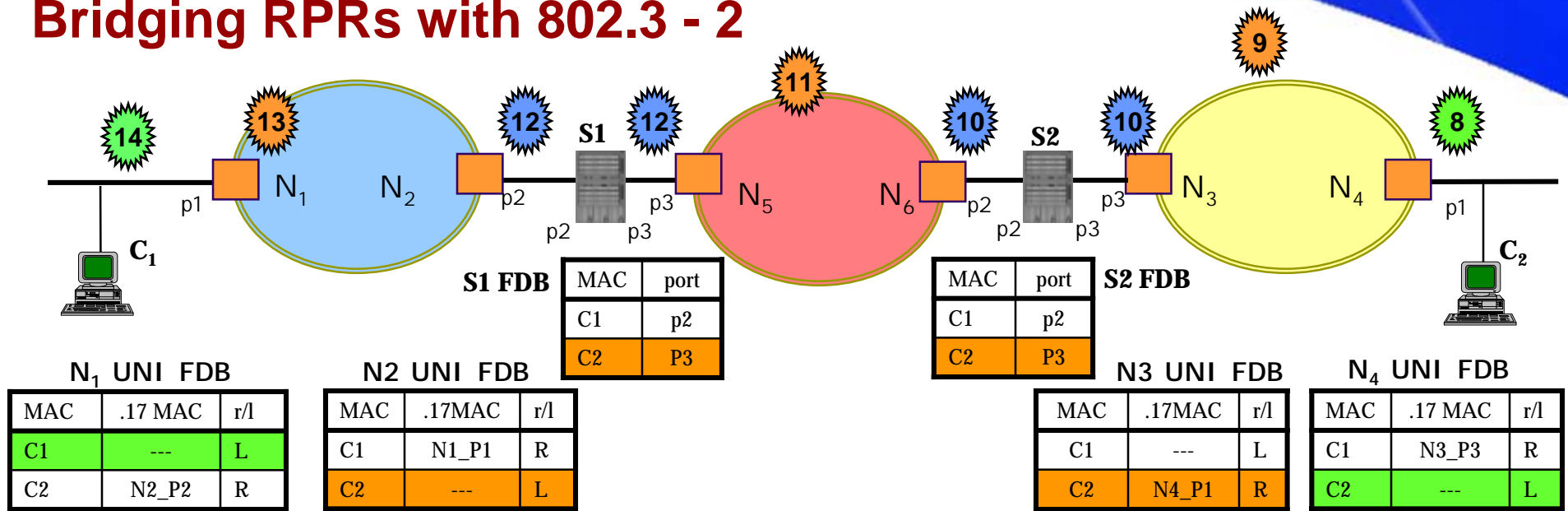
N5 UNI FDB

MAC	.17MAC	r/l
C1	---	L
C2	N6_P2	R

MAC	.17MAC	r/l
C1	N5_P3	R
C2	---	L

N6 UNI FDB

# Bridging RPRs with 802.3 - 2



## Conclusion

- **802.17 can work with 802.1D Transparent Bridging**
  - MAC address scaling issue
- **Some other options to build a L2 network**
  - Single Encapsulation Bridging
  - Double Encapsulation Bridging
    - Single MAC Address at 802.17 MAC station
  - Bridging RPRs with 802.3
    - Use 802.3 to 802.17 encapsulation