Multi-Instance Spanning Tree Protocol

- **Why?**
  - **802.1s/D3 is complex and vulnerable to configuration errors**
- **Who says?**
  - **Comments from York interim**
  - **Complaints from developers**

In 63 Words Or Less

- **MI-STP decouples spanning tree instances from VLANs.**
- **802.1D/Q spanning tree is tunneled over one MI-STP instance without interacting with MI-STP instances (except for TCNs).**
- **MI-STP BPDUs are discarded and not forwarded by 802.1D/Q bridges (except for TCNs).**
- **Each MI-STP instance's root distributes its list of its attached VLANs.**
- **A VLAN follows 802.1D/Q tree outside MI-STP region, follows one MI-STP instance inside MI-STP cloud.**

Decouples STP instances from VLANs.

- **MI-STP BPDUs carry:**
  - **All of the current 802.1D BPDU information.**
  - **Any new 802.1w BPDU information.**
  - **MI-STP spanning tree instance number.**
  - **List of VLANs attached to this MI-STP instance.**
- **MI-STP BPDU has no 802.1p/Q tag.**

802.1D/Q STP tunneled over one MI-STP instance without interaction.

- **802.1D BPDUs never generated by MI-STP bridge.**
- **802.1D BPDUs not interpreted, but carried like data, untagged, over MI-STP instance #1; *not* in a VLAN.**
- **This *may* be the only data carried on MI-STP instance #1.**
- **MI-STP instance #1 must be instantiated in *every* MI-STP bridge.**
- **An MI-STP bridge may have to relay IEEE 802.1D BPDUs “manually”, outside the normal data path.**

MI-STP BPDUs are discarded by 802.1D bridges.

- **MI-STP uses IEEE 802.1D BPDU destination MAC address (or another from the same block).**
  - **Ensures that 802.1D/Q bridge will intercept MI-STP BPDUs.**
- **MI-STP BPDU has new Ethertype and/or protocol number.**
  - **Prevents confusion with 802.1D/Q BPDUs.**
  - **Prevents propagation of MI-STP BPDUs by 802.1D/Q bridges.**

Except for TCNs

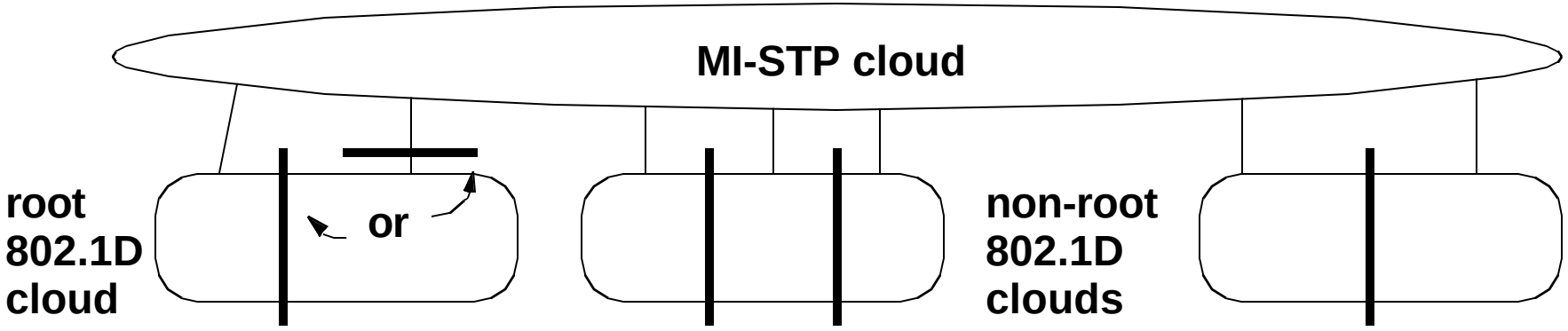
- **Each MI-STP instance root is responsible for relaying Topology Change Notices and/or Topology Change flags as required between MI-STP and legacy IEEE 802.1D worlds.**

Each MI-STP instance's root distributes its list of its attached VLANs.

- **Format of attached VLAN list is open, but will not require much more than 4096 bits == 512 bytes.**
- **VLAN lists:**
  - **Each potential root of a given MI-STP instance *should* be configured with the same list of VLANs.**
  - **Roots of different MI-STP instances *should not* be configured with overlapping lists of VLANs.**
  - **Every VLAN *should* be included in some MI-STP instance's list of VLANs.**
- **Differences resolved by root priority rules + MI-STP instance number. Problem VLANs must block.**

A VLAN follows 802.1D/Q tree outside MI-STP region, follows one MI-STP instance inside MI-STP cloud. (1/2)

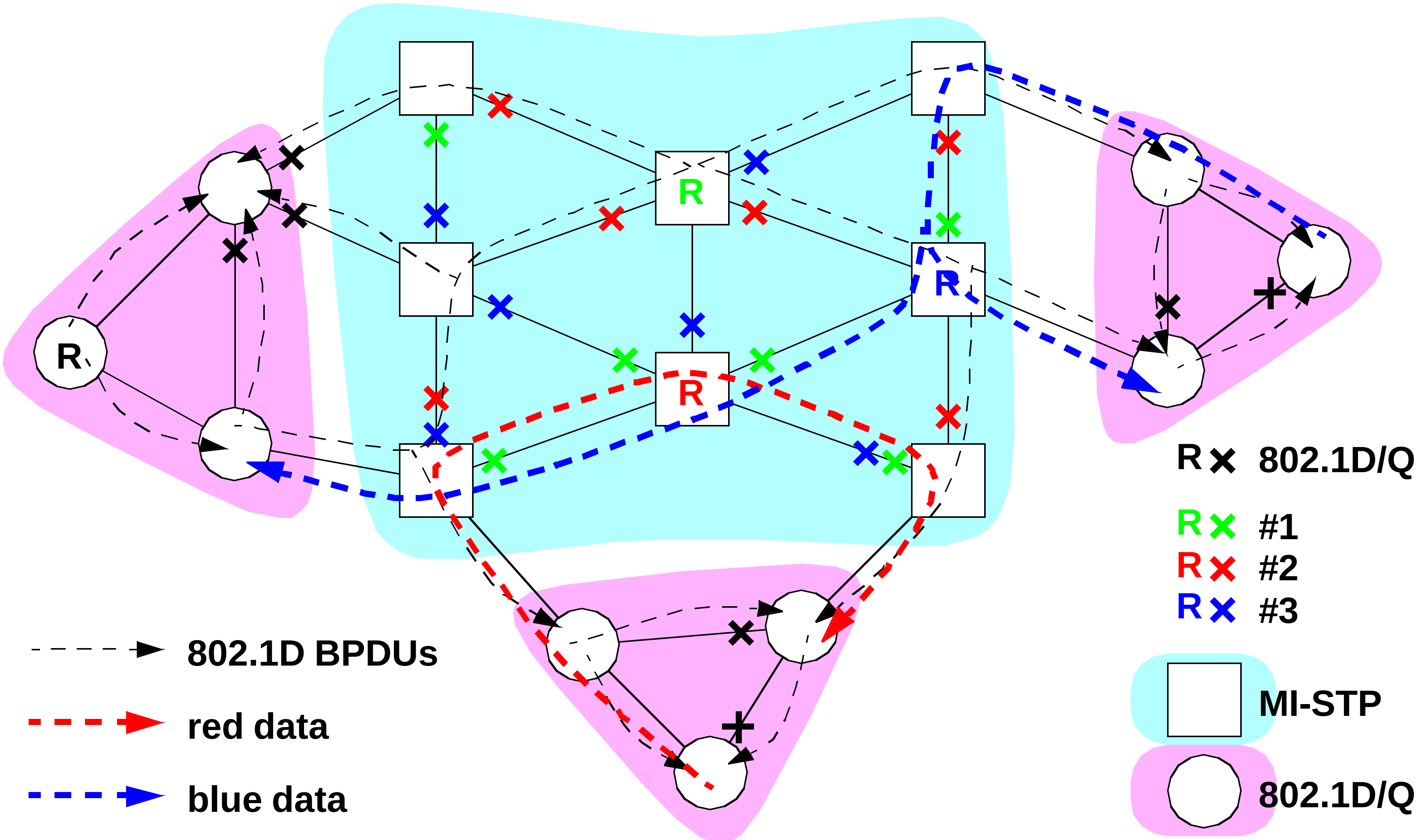
- **To an 802.1D/Q cloud, MI-STP cloud looks like a hubbed network.**
  - **— "Root" 802.1D/Q cloud has exactly one port unblocked to the MI-STP cloud.**
  - **— Non-root 802.1D/Q clouds split into as many pieces as connections to the MI-STP cloud, each getting one connection.**



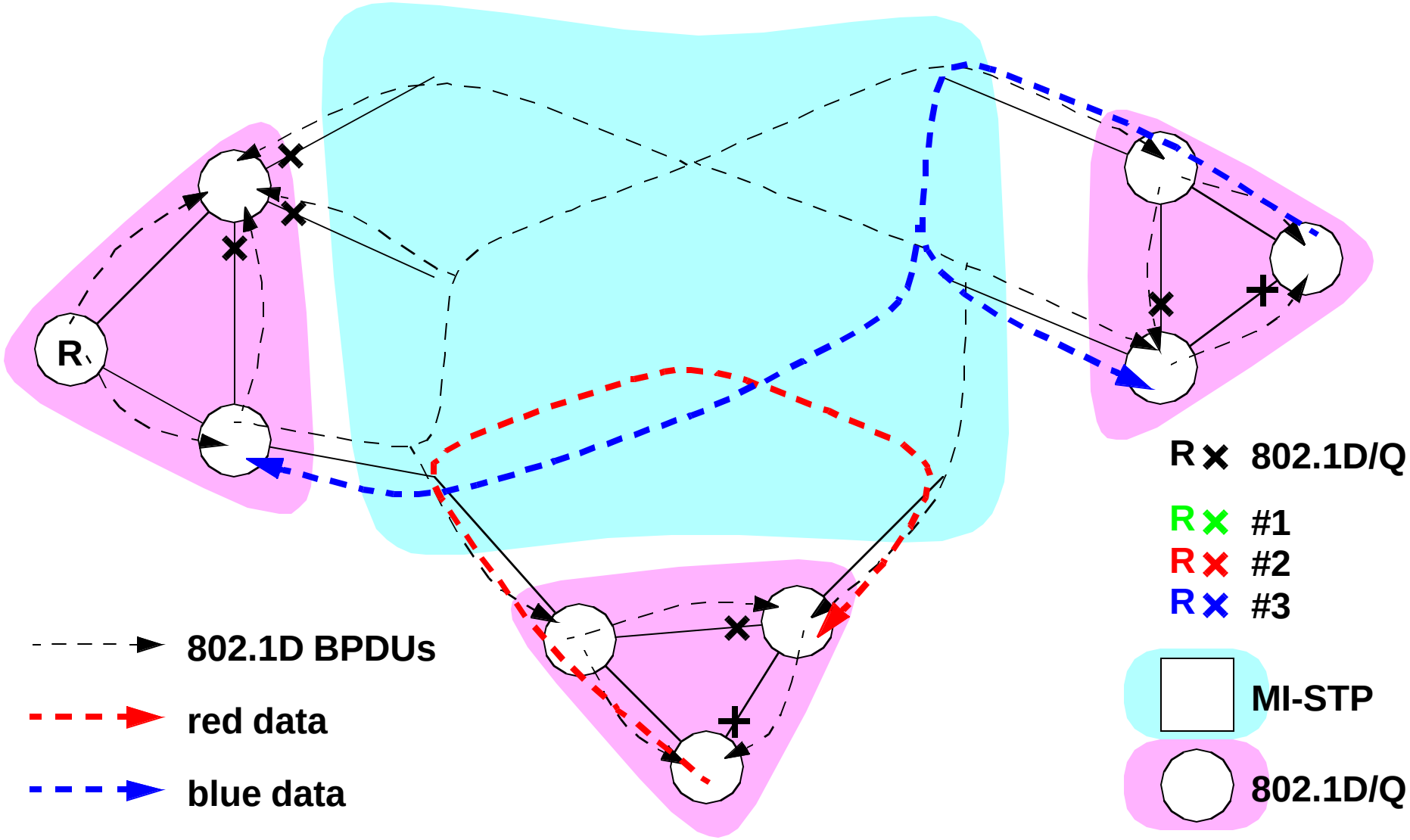
VLAN follows 802.1D/Q outside, one MI-STP inside, MI-STP cloud. (2/2)

- **Data in a VLAN in one 802.1D/Q cloud can get to another 802.1D/Q cloud because those clouds are connected by a “wire”. 802.1D/Q cloud doesn’t care what path VLAN takes inside the MI-STP “wire”.**
- **Once data in MI-STP cloud leaves the cloud, it cannot return, since 802.1D/Q clouds are all split.**
- **Therefore, once inside MI-STP cloud, data to/from an 802.1D/Q cloud need not follow the same path followed by the IEEE 802.1D/Q BPDUs (MI-STP instance #1).**

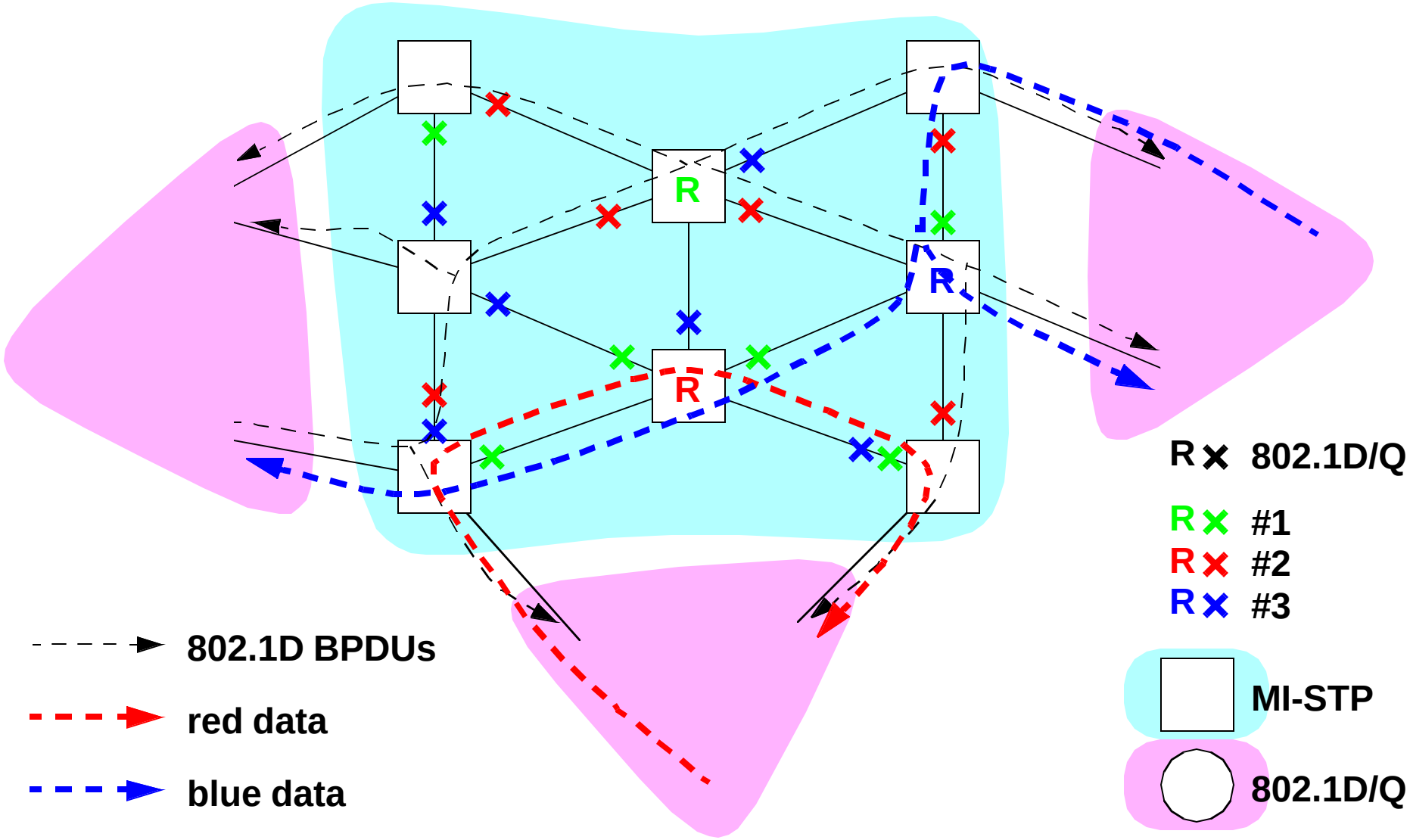
Example 1 (1/3) overall view:



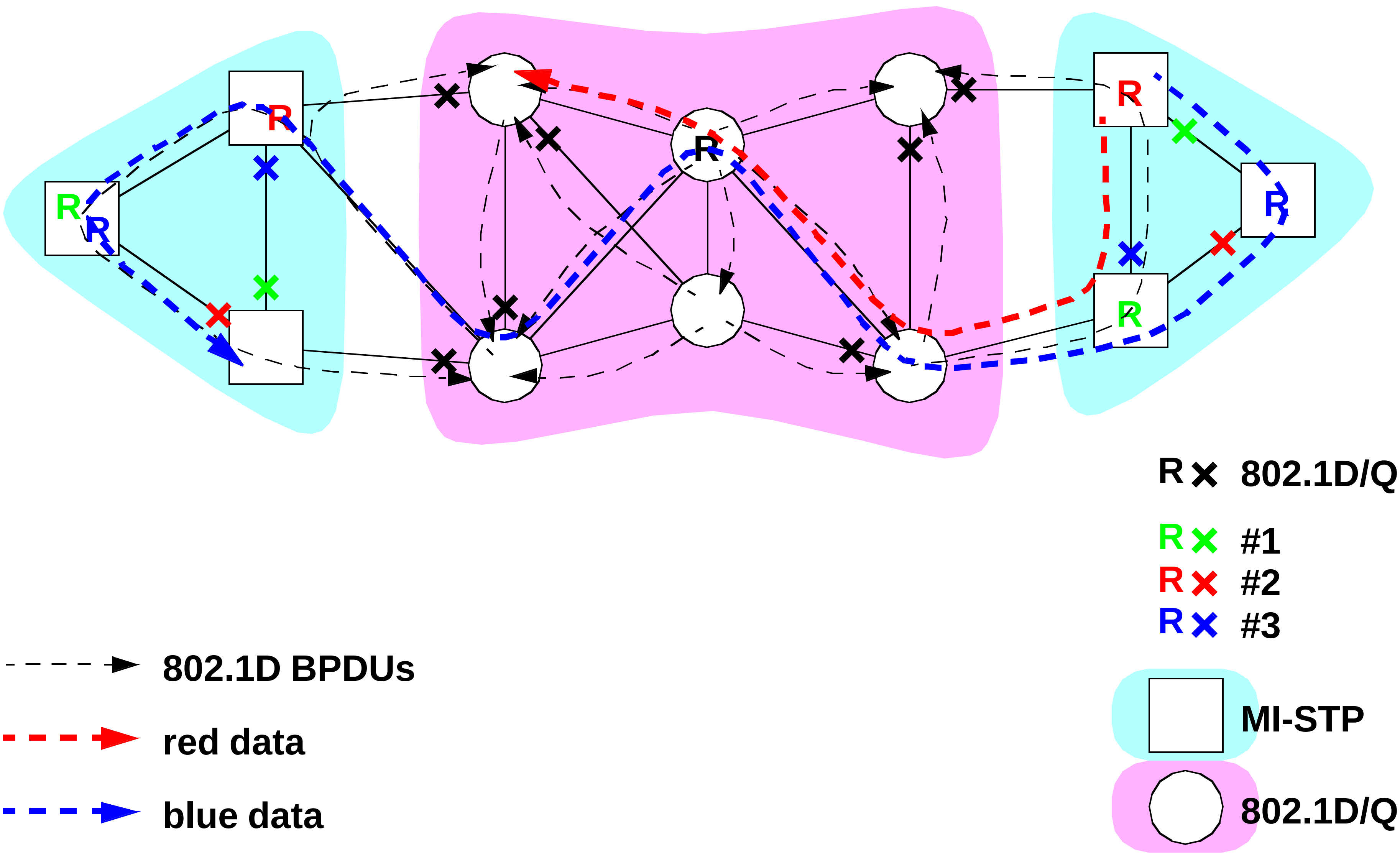
Example 1 (2/3) 802.1D/Q view:



Example 1 (3/3) MI-STP view:



Example 2:



R
R
R
R
R
R
R
R
R
802.1D/Q
#1
#2
#3
802.1D BPDUs
red data
blue data
MI-STP
802.1D/Q

Additional Items

- **One may administratively limit any MI-STP instance, except instance #1, in order to limit the number of bridges in a given MI-STP instance.**
- **One GVRP context per MI-STP instance.**
- **If MI-STP cloud partitions and then heals, 802.1D/Q spanning tree will loop until its BPDUs can pass through the healed partition and cut the loop.**

Question

- **Could this serve as a model for the interaction between 802.1w and 802.1D?**