Technical Report — MSTP Interoperability Between Cisco Catalyst 9500 and Aruba 6400/6300

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1. Introduction

This document analyzes an MSTP interoperability issue between a **Cisco Catalyst 9500** and two **Aruba 6400** chassis (VSX pair), along with an Aruba 6300 distribution switch.

Even though all switches shared identical MSTP parameters (region name, revision, and VLAN-instance mapping), the Cisco Catalyst 9500 reported:

- `PVST Sim.  Inconsistent`
- `PVST Peer Inconsistent`

This prevented the MST region from forming and forced the Port-Channels into a **Broken / Alternate** state.

This report includes:

- Description of the problem
- Full technical analysis
- Root cause findings
- All commands executed (Cisco + Aruba)
- Final clean configuration applied on both platforms

2. Problem Description

The Catalyst 9500 showed:

```
show spanning-tree inconsistentports
MST0 Port-channel1 PVST Sim. Inconsistent, PVST Peer Inconsistent
MST0 Port-channel2 PVST Peer Inconsistent
...
```

Per-instance details:

```
Type: Bound(STP) *PVST, PVST_Peer_Inc
```

This indicates that the Catalyst:

- Was **not receiving MST BPDUs** from the Aruba 6400 - Assumed the neighbor was speaking PVST - Blocked the Port-Channels to avoid a loop

Meanwhile, on the Aruba 6400 LAG interfaces:

```
BPDU Tx Count : 0
BPDU Rx Count : 0
```

This confirms that no MSTP BPDUs were exchanged.

3. Technical Analysis

3.1 MST Region Consistency

Both sides had identical MSTP parameters:

- Region name: `NET-MSTP`
- Revision: 1
- Matching VLAN → instance mapping
- Identical MST digest

Therefore, region mismatch was ruled out.

3.2 Catalyst Detecting PVST Behavior

The flags:

```
PVST Sim. Inconsistent
PVST Peer Inconsistent
```

mean no MST BPDUs were received, forcing the Catalyst to treat the neighbor as PVST.

3.3 Aruba Not Exchanging BPDUs

All LAG interfaces showed:

```
BPDU-Tx : 0
BPDU-Rx : 0
```

Indicating:

- MSTP control frames were not passing over the Port-Channel - Possible BPDU filtering at port level - Possible AOS-CX LAG hashing not forwarding BPDU frames - High probability of software defect

3.4 PVST Simulation Disabled on Cisco

The Catalyst was configured with:

```
no spanning-tree mst simulate pvst global
```

This is valid, supported, and recommended when connecting MST-only domains. However, disabling the PVST simulation does **not** fix missing BPDUs.

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4. Root Cause

The Cisco Catalyst 9500 was not receiving MST BPDUs from the Aruba 6400.

This caused the Catalyst to:

- Detect PVST-like behavior - Break the Port-Channels - Enter `PVST Sim./Peer Inconsistent` state - Block STP convergence

Most likely cause: a software issue in ArubaOS-CX FL.10.13.1010 related to MSTP + LAG control-plane handling.

5. Commands Executed During Troubleshooting

5.1 Cisco Catalyst 9500

```
show spanning-tree inconsistentports
show spanning-tree mst 0
show spanning-tree mst 1
show spanning-tree mst 2
show spanning-tree mst 3
show spanning-tree mst 4
show spanning-tree vlan 700
show spanning-tree vlan 710
show spanning-tree vlan 720
show spanning-tree vlan 730
show spanning-tree mst configuration
show spanning-tree mst configuration digest

conf t
 spanning-tree mode mst
 spanning-tree extend system-id
 no spanning-tree mst simulate pvst global

 spanning-tree mst configuration
  name NET-MSTP
  revision 1
  instance 1 vlan 700-709
  instance 2 vlan 710-719
  instance 3 vlan 720-729
  instance 4 vlan 730-736
 exit

 spanning-tree mst 0-4 priority 61440
```

```
 interface port-channel 1
  no shutdown

 interface port-channel 2
  no shutdown

clear spanning-tree detected-protocols
clear spanning-tree counters

end
write mem
```

5.2 Aruba 6400 / 6300

```
show spanning-tree
show spanning-tree interface lag 17
show spanning-tree interface lag 1
show spanning-tree interface lag 2
show vlan
show lacp interfaces
show version
show running-config | include spanning-tree

conf t
 spanning-tree
 spanning-tree priority 5
 spanning-tree config-name NET-MSTP
 spanning-tree config-revision 1

 spanning-tree instance 1 vlan 700-709
 spanning-tree instance 1 priority 5
 spanning-tree instance 2 vlan 710-719
 spanning-tree instance 2 priority 5
 spanning-tree instance 3 vlan 720-729
 spanning-tree instance 3 priority 5
 spanning-tree instance 4 vlan 730-736
 spanning-tree instance 4 priority 5

 interface lag 17
  no spanning-tree bpdu-filter
  no spanning-tree rpvst-filter
  spanning-tree port-type admin-network
```

```
  no shutdown
```

6. Final Clean Configuration

6.1 Cisco Catalyst 9500 (Final)

```
spanning-tree mode mst
spanning-tree extend system-id
no spanning-tree mst simulate pvst global

spanning-tree mst configuration
 name NET-MSTP
 revision 1
 instance 1 vlan 700-709
 instance 2 vlan 710-719
 instance 3 vlan 720-729
 instance 4 vlan 730-736
 exit

spanning-tree mst 0-4 priority 61440

interface port-channel 1
 no shutdown

interface port-channel 2
 no shutdown
```

6.2 Aruba 6400 / 6300 (Final)

```
spanning-tree
spanning-tree priority 5
spanning-tree config-name NET-MSTP
spanning-tree config-revision 1

spanning-tree instance 1 vlan 700-709
spanning-tree instance 1 priority 5
spanning-tree instance 2 vlan 710-719
spanning-tree instance 2 priority 5
spanning-tree instance 3 vlan 720-729
spanning-tree instance 3 priority 5
spanning-tree instance 4 vlan 730-736
spanning-tree instance 4 priority 5
```

```
interface lag 17
 no spanning-tree bpdu-filter
 no spanning-tree rpvst-filter
 spanning-tree port-type admin-network
 no shutdown
```

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7. Conclusions

- Cisco MSTP configuration was correct and aligned with best practices.
- Aruba 6400 MSTP parameters were correct, but **the switch did not send or receive BPDUs**.
- The Catalyst misclassified the neighbor due to missing BPDUs.
- The most probable cause is an ArubaOS-CX software defect in version FL.10.13.1010.

8. Recommended MSTP Design for the Entire School Network

This chapter presents a unified MSTP design for all switching platforms deployed across the Saint Francis School campus. The design applies to approximately 30 switches, including:

- Aruba 6400 (Core – VSX)
- Aruba 6300 (Distribution / Special-purpose)
- Aruba 3810M (Legacy core/distribution)
- Aruba 2930F / 2930M (Access)

The goal is to maintain one consistent and stable MST region across the campus, avoiding STP reconvergence events, preventing PVST simulation issues, and ensuring predictable forwarding paths.

8.1 Theoretical Framework

MSTP (Multiple Spanning Tree Protocol) provides:

- A single MST region with a shared configuration (name, revision, VLAN mapping)

- Multiple logical spanning-tree instances mapped to VLAN ranges
- Rapid convergence similar to RSTP
- Optimal load-balancing possibilities across instances

To ensure a stable MST region, **all switches must share identical values** for:

- **Region name**: must match byte-for-byte
- **Revision number**: identical across all devices
- **VLAN–instance mapping**: each VLAN must belong to the same MST instance on every switch

Any mismatch forces a switch to create its own region, breaking MSTP adjacency.

8.2 Global Design Logic

The recommended MST structure for the school is:

- **Root Bridge (Primary)**: Aruba 6400 Chassis A
- **Secondary Root**: Aruba 6400 Chassis B
- **Distribution switches**: 6300 and 3810M (priority: 24576 or 28672)
- **Access Layer (2930F / 2930M)**: default priority or set to 32768

ROOT and SECONDARY must always be in the Core VSX pair.

MST Instances:

Instance 1	VLANs 700–709
Instance 2	VLANs 710–719
Instance 3	VLANs 720–729
Instance 4	VLANs 730–736
Instance 0	All remaining VLANs (default CIST)

All access switches (2930F/M) must reproduce the same mapping, even if they do not carry all those VLANs.

8.3 Final MSTP Region Parameters (All Switches)

- Region name: `NET-MSTP`
- Revision: `1`
- Instance-to-VLAN mapping:
  - Instance 1 → VLAN 700–709
  - Instance 2 → VLAN 710–719
  - Instance 3 → VLAN 720–729
  - Instance 4 → VLAN 730–736

MST digest must match across all platforms.

8.4 Final MST Configuration for Aruba 6400 (Core – VSX)

```
spanning-tree
spanning-tree priority 5
spanning-tree config-name NET-MSTP
spanning-tree config-revision 1

spanning-tree instance 1 vlan 700-709
spanning-tree instance 1 priority 5
spanning-tree instance 2 vlan 710-719
spanning-tree instance 2 priority 5
spanning-tree instance 3 vlan 720-729
spanning-tree instance 3 priority 5
spanning-tree instance 4 vlan 730-736
spanning-tree instance 4 priority 5
```

Chassis A → MST root Chassis B → secondary (also priority 5 under VSX – both function as unified root)

8.5 MST Configuration for Aruba 6300 (Distribution)

```
spanning-tree
spanning-tree priority 6
spanning-tree config-name NET-MSTP
spanning-tree config-revision 1

spanning-tree instance 1 vlan 700-709
```

```
spanning-tree instance 1 priority 6
spanning-tree instance 2 vlan 710-719
spanning-tree instance 2 priority 6
spanning-tree instance 3 vlan 720-729
spanning-tree instance 3 priority 6
spanning-tree instance 4 vlan 730-736
spanning-tree instance 4 priority 6
```

8.6 MST Configuration for Aruba 3810M (Legacy Core/Distribution)

```
spanning-tree mode mstp
spanning-tree config-name NET-MSTP
spanning-tree config-revision 1

spanning-tree instance 1 vlan 700-709
spanning-tree instance 2 vlan 710-719
spanning-tree instance 3 vlan 720-729
spanning-tree instance 4 vlan 730-736

spanning-tree priority 28672
```

8.7 MST Configuration for Aruba 2930F / 2930M (Access Layer)

```
spanning-tree mode mstp
spanning-tree config-name NET-MSTP
spanning-tree config-revision 1

spanning-tree instance 1 vlan 700-709
spanning-tree instance 2 vlan 710-719
spanning-tree instance 3 vlan 720-729
spanning-tree instance 4 vlan 730-736

spanning-tree priority 32768
```

8.8 Recommendations for All Access Ports

```
interface <port>
 spanning-tree bpdu-protection
 spanning-tree admin-edge-port
 spanning-tree tcn-guard
```

8.9 Recommendations for Uplink / Trunk Ports

```
interface <uplink>
 spanning-tree admin-network-port
 no spanning-tree bpdu-filter
 no spanning-tree rpvst-filter
```

8.10 Summary of Required MSTP Hierarchy

Layer	Platform	Priority
Core Root	6400 Chassis A/B (VSX)	5
Distribution	6300 / 3810M	6 / 28672
Access	2930F / 2930M	32768

This guarantees:

- Stable MST root election
- Predictable tree convergence
- No PVST simulation issues
- Consistent region digest across all 30 switches
- Compatibility between AOS-CX and AOS-Switch platforms
