



Consistency Checker

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Limitations for Consistency Checker

The Consistency Checker has the following limitations:

- Consistency Checkers are CPU intensive. It is not recommended to run the checkers at very short intervals.
- Legacy Consistency Checkers do not have support for snapshot. So, the previous runs cannot be displayed.
- There is no command to stop/abort the already running Consistency Checkers.
- Forwarding Engine hardware entry validations are partially implemented. Only programming failures can be detected and reported.
- Layer2 MAC Consistency Checker can validate the MAC address in hardware with software copy.
- Consistency checker is designed to reduce false positives in all cases. However, there could be rare cases of reporting a false positive in the following scenarios:
 - Large table state changes (i.e clear, relearn etc).
 - Under very high CPU usage due to any other feature while a consistency checker running. The consistency checker may report inconsistency in processes where CPU usage is high.
- Forwarding engine hardware (FED) check is not entirely supported in Layer3 Multicast Consistency Checker. You can only detect and report on programming failures.
- Forwarding Manager-RP software entry is not supported in Layer3 Multicast Consistency Checker.

Information about Consistency Checker

Overview of Consistency Checker

The Consistency Checker collects information on various table states within the software and the hardware. It compares the software state with the hardware state. If there is any inconsistency, it flags the issue immediately. This helps to reduce increased troubleshooting time at a later period. The consistency checker supplements basic troubleshooting and helps to identify scenarios where inconsistent states between software and hardware tables are causing issues in the network, thereby reducing the mean time to resolve the issue.

There are two types of consistency checker implementation available:

- Legacy Consistency Checker - supports validating the entry from control plane to the forwarding engine (or hardware copy).
- End-to-End Consistency Checker - supports validating the software entry from control plane to all processes involved in distributing and handling the entry, as well as the forwarding engine's hardware copy.

End-to-End Consistency Checker

End-to-End (E2E) Consistency Checker supports full scan and single entry and should be started manually or run via gold diagnostic. The consistency checker can be started for a single entry using the command which helps to isolate the issue at which forwarding process entry is not consistent and helps speed up the debugging.

Every time the consistency checker is started, a runID is provided. Using the runID, its status, summary, details can be viewed. The last 5 snapshots are available any time for you to check the previous run's result.

E2E consistency checker performs the following functions:

- Validates the IOS entry to software tables/processes (Forwarding manger-RP, Forwarding manager-FP and FED) for all modules.
- Reports various inconsistencies (entry inconsistent, entry missing, stale entry) and sends a syslog to alert the administrator.
- Helps to speed up the fault isolation.
- Records any inconsistent entry with relevant data.
- Consistency checker supports the recursive single entry check which can validate the dependent objects along with the actual entry. (i.e, A Layer 3 Multicast with N outgoing interfaces can be validated for multicast entries along with OIFs programming, OIF's Adjacency validation, etc)
- Constant memory usages irrespective of total entries in a table.



Note The consistency checker is bound to CPU utilization and can not exceed the configured value while validating the tables across processes.

Features Supported in Consistency Checker

The following features are supported in consistency checker:

- Legacy Consistency Checker
 - **Layer2 MAC Consistency Checker:** This consistency checker validates the IOS entry to FED software entry. It also validates the MAC address into hardware tables.
 - **Layer3 FMANFP Entry Consistency Checker:** This consistency checker validates the Layer 2, Layer 3, and multicast objects status in the Forwarding Manager-FP process. This includes stale objects and long pending objects.
- E2E Consistency Checker
 - **Layer2 Multicast Consistency Checker:** This consistency checker validates the IOS Layer 2 multicast IGMP/MLD VLAN, the group entry to Forwarding Manager-FP software entry, FED software entry, and FED hardware programming errors.
 - **Layer3 Multicast Consistency Checker:** This consistency checker validates the IOS Layer 3 multicast IGMP/MLD VLAN, the group entry to Forwarding Manager-FP software entry and FED software entry.

Running the Consistency Checker

The table shown below lists the commands to run the various consistency checkers:

Command	Purpose
show consistency-checker l2	Runs the consistency-checker on the Layer 2 forwarding tables.
show consistency-checker l3	Runs the consistency-checker on the Layer 3 forwarding tables.
show consistency-checker mcast l2m	Runs the consistency-checker on the Layer 2 multicast forwarding tables.
show consistency-checker mcast l3m	Runs the consistency-checker on the Layer 3 multicast forwarding tables.
show consistency-checker objects	Runs the End-to-End consistency-checker on objects.
show consistency-checker run-id <i>run-id</i>	Runs the End-to-End consistency-checker by run ID.
show consistency-checker switch	Runs the consistency-checker on the specified switch.

Output Examples for Consistency Checker

The following is a sample output for the **show consistency-checker mcast l2m** command where the consistency checker runs a full scan:

```

Device# show consistency-checker mcast l2m start all
L2 multicast Full scan started. Run_id: 2
Use 'show consistency-checker run-id 2 status' for completion status.

Device#
*Feb 17 06:19:14.889: %FED_CCK_ERRMSG-4-INCONSISTENCY_FOUND: F0/0: fed: Consistency
Checker(CCK) detected inconsistency for l2m_vlan. Check 'show consistency run-id 2 detail'.
*Feb 17 06:19:14.890: %FED_CCK_ERRMSG-4-INCONSISTENCY_FOUND: F0/0: fed: Consistency
Checker(CCK) detected inconsistency for l2m_group. Check 'show consistency run-id 2 detail'.
Device#
*Feb 17 06:19:19.432: %IOSXE_FMANRP_CCK-6-FMANRP_COMPLETED: Consistency Check for Run-Id 2
is completed. Check 'show consistency-checker run-id 2'.
Device#
Device# show consistency-checker run-id 2 status
Process: IOSD
  Object-Type      Status           Time(sec)      Exceptions
  l2m_vlan         Completed        13             No
  l2m_group        Completed        13             No

Process: FMAN-FP
  Object-Type      Status           Time(sec)      State
  l2m_vlan         Completed        9              Consistent
  l2m_group        Completed        9              Consistent

Process: FED
  Object-Type      Status           Time(sec)      State
  l2m_vlan         Completed        9              Inconsistent
  l2m_group        Completed        9              Inconsistent

Device#
Device# show consistency-checker run-id 2
Process: IOSD
  Object-Type      Start-time           Entries      Exceptions
  l2m_vlan         2021/02/17 06:19:05  22          0
  l2m_group        2021/02/17 06:19:05  24          0

Process: FMAN-FP
  *Statistics(A/I/M/S/Oth): Actual/Inherited/Missing/Stale/Others

  Object-Type      Start-time           State          A/  I/  M/  S/Oth
  l2m_vlan         2021/02/17 06:19:05  Consistent    0/  0/  0/  0
  l2m_group        2021/02/17 06:19:05  Consistent    0/  0/  0/  0

Process: FED
  *Statistics(A/I/M/S/HW/Oth): Actual/Inherited/Missing/Stale/Hardware/Others

  Object-Type      Start-time           State          A/  I/  M/  S/ HW/Oth
  l2m_vlan         2021/02/17 06:19:05  Inconsistent  1/  0/  0/168/ 0/ 0
  l2m_group        2021/02/17 06:19:05  Inconsistent  4/  0/  2/  0/ 0/ 0

Device#
Device# show consistency-checker run-id 2 detail
Process: IOSD

Process: FMAN-FP

Process: FED
  Object-Type:l2m_vlan  Start-time:2021/02/17 06:19:05
  Status:Completed     State:Inconsistent
  Key/data              Reason
  (Ipv4, vlan: 768)    Stale
  snoop:off stp_tcn:off flood:off pimsn:off
  (Ipv4, vlan: 769)    Stale

```

```

      snoop:off stp_tcn:off flood:off pimsn:off
      (Ipv6, vlan: 900)                               Inconsistent
      snoop:on stp_tcn:on flood:on pimsn:off
      (Ipv6, vlan: 767)                               Stale
      snoop:off stp_tcn:off flood:off pimsn:off

Object-Type:l2m_group  Start-time:2021/02/17 06:19:05
Status:Completed     State:Inconsistent
Key/data              Reason
(Ipv4, vlan:100 (*,227.0.0.0))  Inconsistent
  Group ports: total entries: 0
(Ipv4, vlan:100 (*,227.1.0.0))  Missing

```

Device#

The following is a sample output for the **show consistency-checker mcast l2m** command where the consistency checker runs a recursive single-entry scan:

```

Device# show consistency-checker mcast l2m start vlan 900 229.1.1.1 recursive
Single entry scan started with Run_id: 2

```

```

*Feb 17 06:54:09.880: %IOSXE_FMANRP_CCK-6-FMANRP_COMPLETED: Consistency Check for Run-Id 2
is completed.

```

```

Check 'show consistency-checker run-id 2'.

```

Device#

```

Device# show consistency-checker run-id 2

```

Process: IOSD

Object-Type	Start-time	Entries	Exceptions
l2m_vlan	2021/02/17 06:54:01	1	0
l2m_group	2021/02/17 06:54:01	1	0

Process: FMAN-FP

*Statistics(A/I/M/S/O): Actual/Inherited/Missing/Stale/Others

Object-Type	Start-time	State	A	I	M	S	O
l2m_vlan	1970/01/01 00:10:03	Consistent	0/	0/	0/	0/	0
l2m_group	1970/01/01 00:10:03	Consistent	0/	0/	0/	0/	0

Process: FED

*Statistics(A/I/M/S/HW/O): Actual/Inherited/Missing/Stale/Hardware/Others

Object-Type	Start-time	State	A	I	M	S	HW	O
l2m_vlan	2021/02/17 06:54:01	Inconsistent	1/	0/	0/	0/	0/	0
l2m_group	2021/02/17 06:54:01	Inconsistent	0/	1/	0/	0/	0/	0

Device#

```

Device# show consistency-checker run-id 2 detail

```

Process: IOSD

```

Object-Type:l2m_vlan  Start-time:2021/02/17 06:54:01
Key/data              Reason
(Ipv4, vlan:900)      Success
  snoop:on stp_tcn:off flood:off pimsn:off

```

```

Object-Type:l2m_group  Start-time:2021/02/17 06:54:01
Key/data              Reason
(Ipv4, vlan:900, (*,229.1.1.1))  Success
  Twel/0/5

```

Process: FMAN-FP

Process: FED

```

Object-Type:l2m_group  Start-time:2021/02/17 06:54:01

```

```

Status:Completed   State:Inconsistent
Key/data
(Ipv4, vlan:900 (*,229.1.1.1))      Reason
Group ports: total entries: 1      Inherited
  TwentyFiveGigE1/0/5

-----Recursion-level-1-----
Object-Type:l2m_vlan   Start-time:2021/02/17 06:54:01
Status:Completed   State:Inconsistent
Key/data
(Ipv4, vlan: 900)      Reason
snoop:on stp_tcn:off flood:on pimsn:off      Inconsistent

```

Device#

The following is a sample output for the **show consistency-checker objects** command where the consistency checker runs a scan on objects:

```

Device# show consistency-checker objects l2m_group
Process: IOSD
  Run-id   Start-time           Exception
  1        2021/02/17 05:20:42  0
  2        2021/02/17 06:19:05  0

Process: FMAN-FP
  *Statistics(A/I/M/S/Oth): Actual/Inherited/Missing/Stale/Others

  Run-id   Start-time           State           A/  I/  M/  S/Oth
  1        2021/02/17 05:20:42  Consistent     0/  0/  0/  0/  0
  2        2021/02/17 06:19:05  Consistent     0/  0/  0/  0/  0

Process: FED
  *Statistics(A/I/M/S/HW/Oth): Actual/Inherited/Missing/Stale/Hardware/Others

  Run-id   Start-time           State           A/  I/  M/  S/ HW/Oth
  1        2021/02/17 05:20:42  Consistent     0/  0/  0/  0/  0/  0
  2        2021/02/17 06:19:05  Inconsistent   4/  0/  2/  0/  0/  0

Device#
Stark#sh consistency-checker run 2 detail
Process: IOSD
  Object-Type:l2m_vlan   Start-time:2021/02/17 06:54:01
  Key/data
  (Ipv4, vlan:900)      Reason
  snoop:on stp_tcn:off flood:off pimsn:off      Success

  Object-Type:l2m_group   Start-time:2021/02/17 06:54:01
  Key/data
  (Ipv4, vlan:900, (*,229.1.1.1))      Reason
  Twel/0/5      Success

Process: FMAN-FP

Process: FED
  Object-Type:l2m_group   Start-time:2021/02/17 06:54:01
  Status:Completed   State:Inconsistent
  Key/data
  (Ipv4, vlan:900 (*,229.1.1.1))      Reason
  Group ports: total entries: 1      Inherited
  TwentyFiveGigE1/0/5

-----Recursion-level-1-----
Object-Type:l2m_vlan   Start-time:2021/02/17 06:54:01

```

```

Status:Completed   State:Inconsistent
Key/data                                     Reason
(Ipv4, vlan: 900)                               Inconsistent
snoop:on stp_tcn:off flood:on pimsn:off

```

```

Device# show consistency-checker objects l2m_group 2 detail
Process: IOSD

```

```

Process: FMAN-FP

```

```

Process: FED

```

```

Object-Type:l2m_group   Start-time:2021/02/17 06:19:05
Status:Completed   State:Inconsistent
Key/data                                     Reason
(Ipv4, vlan:100 (*,227.0.0.0))               Inconsistent
  Group ports: total entries: 0
(Ipv4, vlan:100 (*,227.1.0.0))               Missing
(Ipv4, vlan:100 (*,227.0.0.1))               Inconsistent
  Group ports: total entries: 0
(Ipv4, vlan:100 (*,227.1.0.1))               Missing
(Ipv4, vlan:100 (*,227.0.0.2))               Inconsistent
  Group ports: total entries: 0
(Ipv4, vlan:100 (*,227.0.0.3))               Inconsistent
  Group ports: total entries: 0

```

```

Device#

```

The following is a sample output for the **show consistency-checker mcast l3m** command where the consistency checker runs a full scan:

```

Device#sh consistency-checker mcast l3m start all
L3 multicast Full scan started. Run_id: 1
Use 'show consistency-checker run-id 1 status' for completion status.

```

```

Device#

```

```

*Apr  2 17:30:01.831: %IOSXE_FMANRP_CCK-6-FMANRP_COMPLETED: Consistency Check for Run-Id 1
is completed. Check 'show consistency-checker run-id 1'.

```

```

Device#sh consistency-checker run-id 1

```

```

Process: IOSD

```

```

Flags:   F - Full Table Scan, S - Single Entry Run
         RE - Recursive Check, GD - Garbage Detector
         Hw - Hardware Check, HS - Hardware Shadow Copy

```

Object-Type	Start-time	Entries	Exceptions	Flags
l3m_entry	2021/04/02 17:29:35	8	0	F GD Hw HS

```

Process: FMAN-FP

```

```

*Statistics(A/I/M/S/Oth): Actual/Inherited/Missing/Stale/Others

```

Object-Type	Start-time	State	A/	I/	M/	S/Oth
l3m_entry	2021/04/02 17:29:35	Consistent	0/	0/	0/	0/ 0

```

Process: FED

```

```

*Statistics(A/I/M/S/HW/Oth): Actual/Inherited/Missing/Stale/Hardware/Others

```

Object-Type	Start-time	State	A/	I/	M/	S/	HW/Oth
l3m_entry	2021/04/02 17:29:35	Consistent	0/	0/	0/	0/	0/ 0

```

Device#sh consistency-checker mcast l3m start 225.1.1.1 recursive
Single entry scan started with Run_id: 2
Use 'show consistency-checker run-id 2 status' for completion status.

```

```

Device#sh consistency-checker run-id 2 status

```

```

Process: IOSD

```

```

Object-Type      Status          Time(sec)      Exceptions
12m_vlan        Completed      11             No
12m_group       Completed      11             No
13m_entry       Completed      11             No

Process: FMAN-FP
Object-Type      Status          Time(sec)      State
12m_vlan        Completed      12             Consistent
12m_group       Completed      12             Consistent
13m_entry       Completed      12             Consistent

Process: FED
Object-Type      Status          Time(sec)      State
12m_vlan        Completed      12             Consistent
12m_group       Completed      12             Consistent
13m_entry       Completed      12             Consistent

Device#sh consistency-checker run-id 2 detail
Process: IOSD
Object-Type:l2m_vlan  Start-time:2021/04/02 17:34:12
  Key/data          Reason
  (Ipv4, vlan:100)  Success
  snoop:on stp_tcn:off flood:off pimsn:off

Object-Type:l2m_group  Start-time:2021/04/02 17:34:12
  Key/data          Reason
  (Ipv4, vlan:100, (*,225.1.1.1))  Success
  Fo1/0/3

Object-Type:l3m_entry  Start-time:2021/04/02 17:34:12
  Key/data          Reason
  (Ipv4, (*,225.1.1.1))  Success
  Entry flags: C
  Total entries: 1
  Obj_id: F80004A1 Obj_flags: F

Process: FMAN-FP
Process: FED

```

The following is a sample output for the **show consistency-checker mcast l3m** command where the consistency checker runs a recursive single-entry scan:

```

Device#sh consistency-checker mcast l3m start 225.1.1.1 15.1.1.1 recursive
Single entry scan started with Run_id: 4
Use 'show consistency-checker run-id 4 status' for completion status.
Device#sh consistency-checker run-id 4 status
Process: IOSD
Object-Type      Status          Time(sec)      Exceptions
12m_vlan        Completed      10             No
12m_group       Completed      10             No
13m_entry       Completed      10             No

Process: FMAN-FP
Object-Type      Status          Time(sec)      State
12m_vlan        Completed      11             Consistent
12m_group       Completed      11             Consistent
13m_entry       Completed      11             Consistent

Process: FED
Object-Type      Status          Time(sec)      State
12m_vlan        Completed      11             Consistent
12m_group       Completed      11             Consistent
13m_entry       Completed      11             Consistent

Device#sh consistency-checker run-id 4 detail
Process: IOSD

```



```

Object-Type:l2m_vlan   Start-time:2021/04/02 17:37:36
Key/data              Reason
(Ipv4, vlan:100)      Success
  snoop:on stp_tcn:off flood:off pimsn:off

Object-Type:l2m_group  Start-time:2021/04/02 17:37:36
Key/data              Reason
(Ipv4, vlan:100, (*,225.1.1.1))  Success
  Fo1/0/3

Object-Type:l3m_entry  Start-time:2021/04/02 17:37:36
Key/data              Reason
(Ipv4, vrf:, (15.1.1.1,225.1.1.1))  Success
  Entry flags:
  Total entries: 2
  Obj_id: F80004A1 Obj_flags: F
  Obj_id: F80003C1 Obj_flags: A

Process: FMAN-FP
Process: FED

```

The following is a sample output for the **show diagnostic content** command where end to end consistency is checked through gold diagnostics:

```
Device#show diagnostic content switch all
```

```
switch 2 module 1:
```

```

Diagnostics test suite attributes:
M/C/* - Minimal bootup level test / Complete bootup level test / NA
B/* - Basic ondemand test / NA
P/V/* - Per port test / Per device test / NA
D/N/* - Disruptive test / Non-disruptive test / NA
S/* - Only applicable to standby unit / NA
X/* - Not a health monitoring test / NA
F/* - Fixed monitoring interval test / NA
E/* - Always enabled monitoring test / NA
A/I - Monitoring is active / Monitoring is inactive

```

ID	Test Name	Attributes	Test Interval day hh:mm:ss.ms	Three- day shold
1)	TestGoldPktLoopback	*BPN*X**I	not configured	n/a
2)	TestOBFL	*B*N*X**I	not configured	n/a
3)	TestFantray	*B*N****A	000 00:01:40.00	1
4)	TestPhyLoopback	*BPD*X**I	not configured	n/a
5)	TestThermal	*B*N****A	000 00:01:30.00	1
6)	TestScratchRegister	*B*N****A	000 00:01:30.00	5
7)	TestPortTxMonitoring	*BPN****A	000 00:02:30.00	1
8)	TestConsistencyCheckL2	*B*N****A	000 00:01:30.00	1
9)	TestConsistencyCheckL3	*B*N****A	000 00:01:30.00	1
10)	TestConsistencyCheckMcast	*B*N****A	000 00:01:30.00	1
11)	TestConsistencyCheckL2m	*B*N****A	000 00:01:30.00	1
12)	TestConsistencyCheckL3m	*B*N****A	000 00:01:30.00	1

This gives the status of consistency check for multicast

Feature History for Consistency Checker

This table provides release and related information for the features explained in this module.

These features are available in all the releases subsequent to the one they were introduced in, unless noted otherwise.

Release	Feature	Feature Information
Cisco IOS XE Amsterdam 17.3.1	Consistency Checker	The Consistency Checker collects information on various table states within the software and the hardware and flags any inconsistency it finds immediately. It supplements basic troubleshooting and helps to identify scenarios where inconsistent states between software and hardware tables are causing issues in the network, thereby reducing the mean time to resolve the issue.
Cisco IOS XE Bengaluru 17.6.1	Consistency Checker	This feature was enhanced and the multicast consistency checkers were introduced. The following keywords were added to the show consistency-checker command: mcast , objects , and run-id .
Cisco IOS XE Cupertino 17.7.1	Consistency Checker	Support for this feature was introduced on the C9500X-28C8D model of the Cisco Catalyst 9500 Series Switches.

Use the Cisco Feature Navigator to find information about platform and software image support. To access Cisco Feature Navigator, go to <https://cfng.cisco.com/>

<http://www.cisco.com/go/cfn>.