Huawei Storage Troubleshooting Skills

2020/9/9

Security Level:

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Foreword

- To understand basic troubleshooting skills is very important activity in routine maintenance.
- This course introduces how to troubleshooting storage common issues.

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Troubleshooting Fundamental Rules

- Analyze from “Top” to “Bottom”
  - ✓ Completely collect all the issue symptoms. Which of the hosts? When? How? What change did before?
  - ✓ Check storage alarm and indicator
  - ✓ For emergency issue, involve Huawei support or local office right after
- Analyze High Severity Alarm First
  - ✓ Analyze the Critical alarm first, then Major and Minor alarm.
- Analyze Common and Latest Alarm First
  - ✓ Analyze the latest alarm with higher priority. If there’re multiple alarms, check the scope of the issue, for example, all the alarms related to HyperMetro feature.

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Analyze Alarm

Refer to product documentation to check the alarm and error code.

For example:

12344630 2019-07-22 17:34:19 DST **0xF00CF005F** Fault Major Unrecovered None Controller (Controller Enclosure CTE0, controller A, item 03057201, SN 210305720110XXXXXXXX) is faulty. Error code: **0x4000cf4d**.Collect all related information and contact technical support engineers to replace the controller.

https://support.huawei.com/enterprise/en/doc/EDOC1000138404?idPath=7919749%7C251366268%7C250389224%7C251366266%7C21538251

0x4000CF4D

Error Code	Description	Possible Causes	Handling Suggestion	Applicable Model
0x4000CF4D	A system disk on a control module is about to fail.	A system disk on a control module is about to fail.	Replace the controller.	Applicable to all models.

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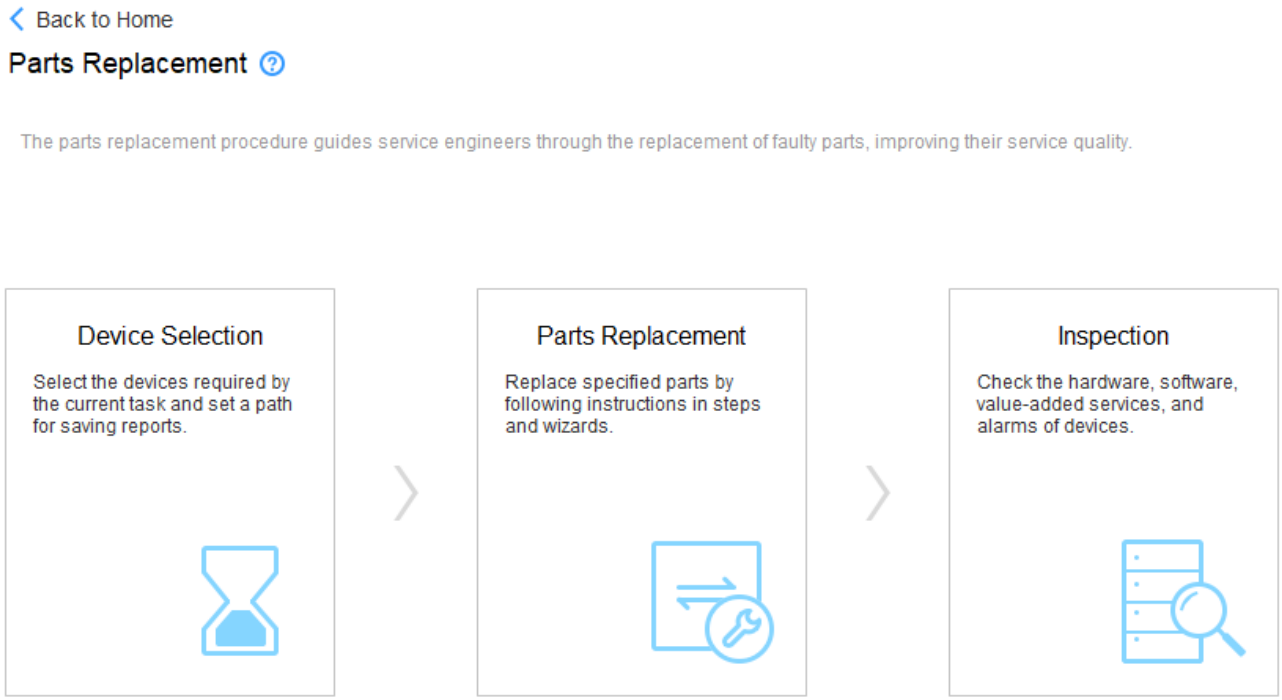
Component Replacement Method

- Tool-Based CRU and FRU Replacement
  - Follow the wizard to check system status before replacement, and inspect after replacement. Especially, risky disk, controller, enclosure replacement



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Collect Log by Device Manager

- Collect “System Log” -> “All logs” for most of the failure diagnose
  - ✓ Running Data: Device alarm and history event
  - ✓ System Log(Recent logs): Recent storage log without diagnose information.
  - ✓ **System Log(All logs): Complete storage log with diagnose information, including Running Data, Disk Log, etc.**
  - ✓ Disk Log: Disk health assessment information and faulty disk SMART
  - ✓ Storage Resource: Storage pool, LUN, file system, Quota tree, and quota information sort to excel
  - ✓ Diagnostic File: Internal module diagnose information, including hardware and software

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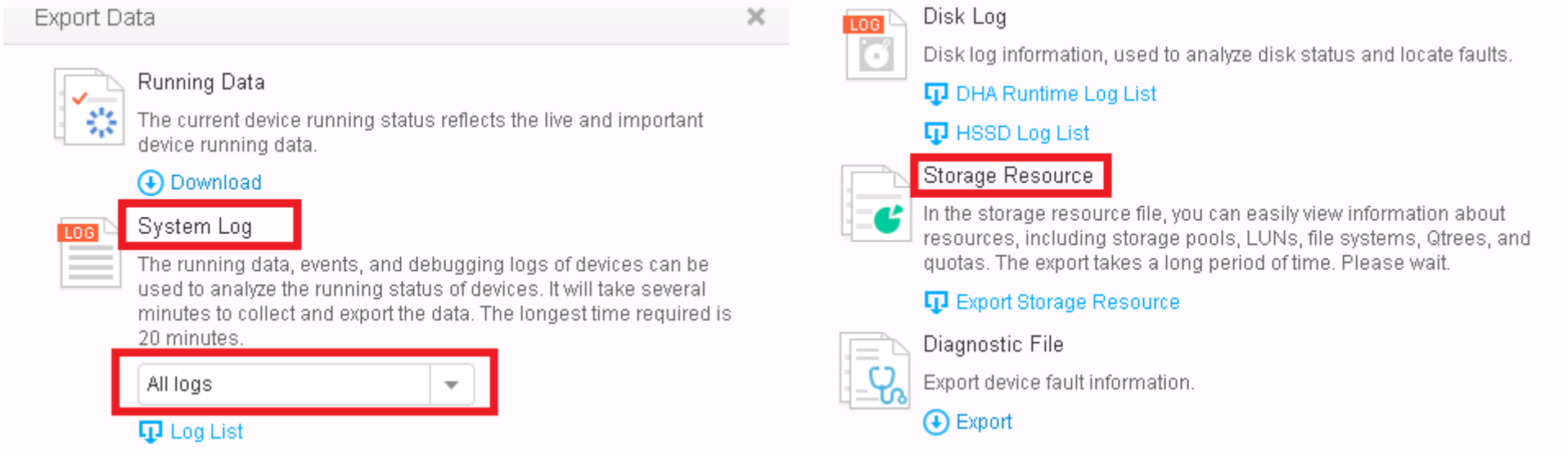
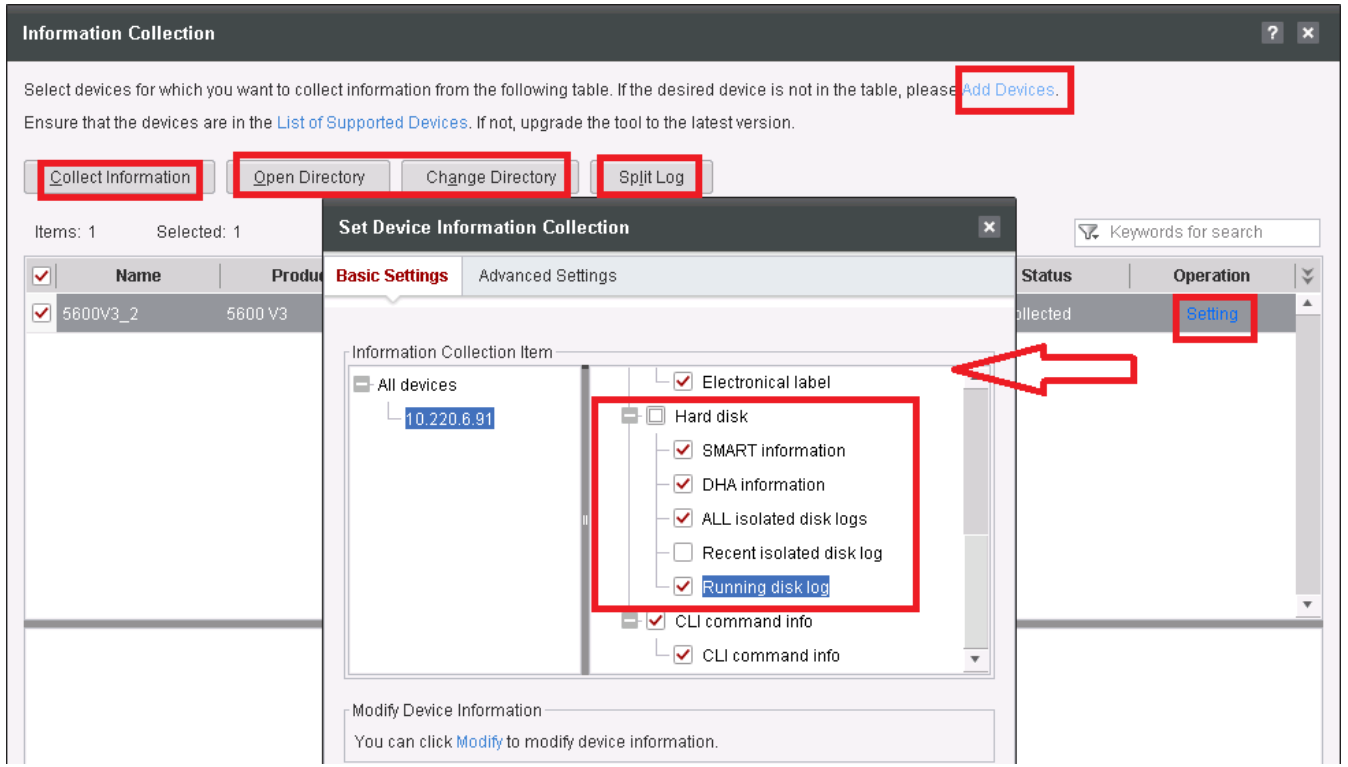
Collect Log by Device Manager(Continue)

- Collect “Storage Resource” to get NAS related configuration



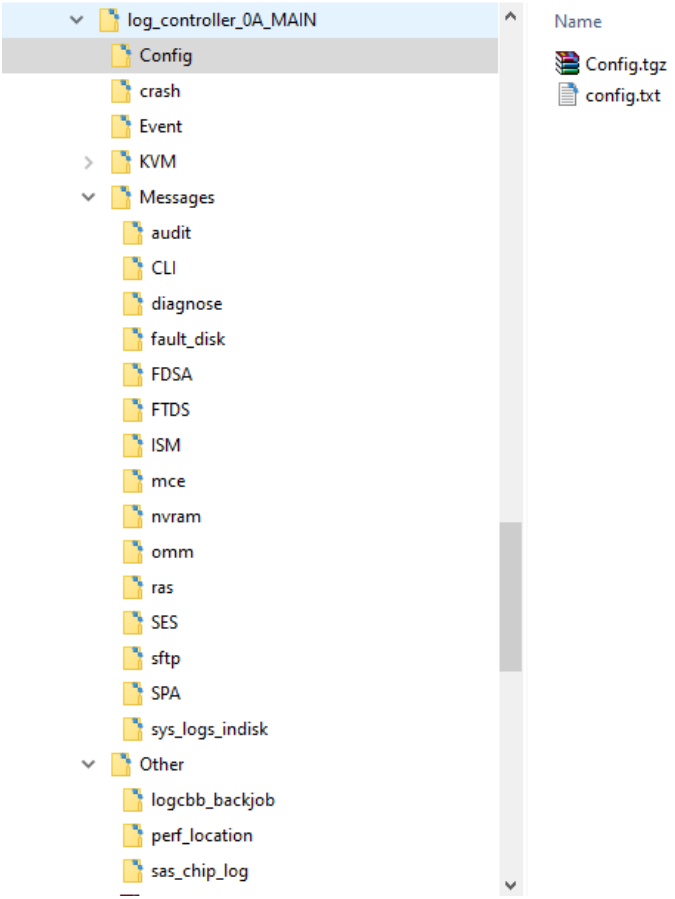
Collect Log by SmartKit

- ✓ For deep diagnose for issues like high disk failure rate, need to collect Running disk log and all disk SMART by SmartKit.



Storage Log Structure

- ✓ Config -> config.txt: collect on master controller, including all hardware and software configuration(status)
- ✓ Event -> Event.txt: collect on master controller, including current alarm and history events
- ✓ Messages -> sys_logs_indisk: history OS log, like Linux /var/log/messages, including NVRAM dump log for controller abnormal reset



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Basic Log Analysis

✓Check hardware status and software configuration by config.txt

```
SFP Info:
    Vendor: Hisense
    Model: LTF8502-BC+
    SN: N3383022418
    Health Status: Normal
    Running Status: Link Up
    Type: Multi Mode
    Working Rate(Mbps): 10000
    Temperature(C): 31
    RxPowerReal(uW): 576.1
    RXPowerMax(uW): 1258.9
    RXPowerMin(uW): 64.6
    TxPowerReal(uW): 587.7
    TXPowerMax(uW): 794.3
    TXPowerMin(uW): 186.2
    Item: --
    ExternalModel: --
    Rev: --
```

```
Initial Capacity: 1048576(KB)
Compression Enabled: Yes
Compression Method: Fast
Dedup Enabled: Yes
Byte_by_byte Comparison Enabled: No
Intelligent Dedup Enabled: Yes
Dedup Metadata Sample Ratio: 2
Dedup Running Status: Yes
Dedup Saved Capacity: 53130968(KB)
Dedup Saved Ratio(%): 11
Compression Saved Capacity: 129415074(KB)
Compression Saved Ratio(%): 28
Total Saved Capacity: 182546042(KB)
Total Saved Ratio(%): 39
Original Total Capacity: 450223161(KB)
Thresholds Percent(%): 90
Thresholds Switch: Off
Vstore ID: --
```

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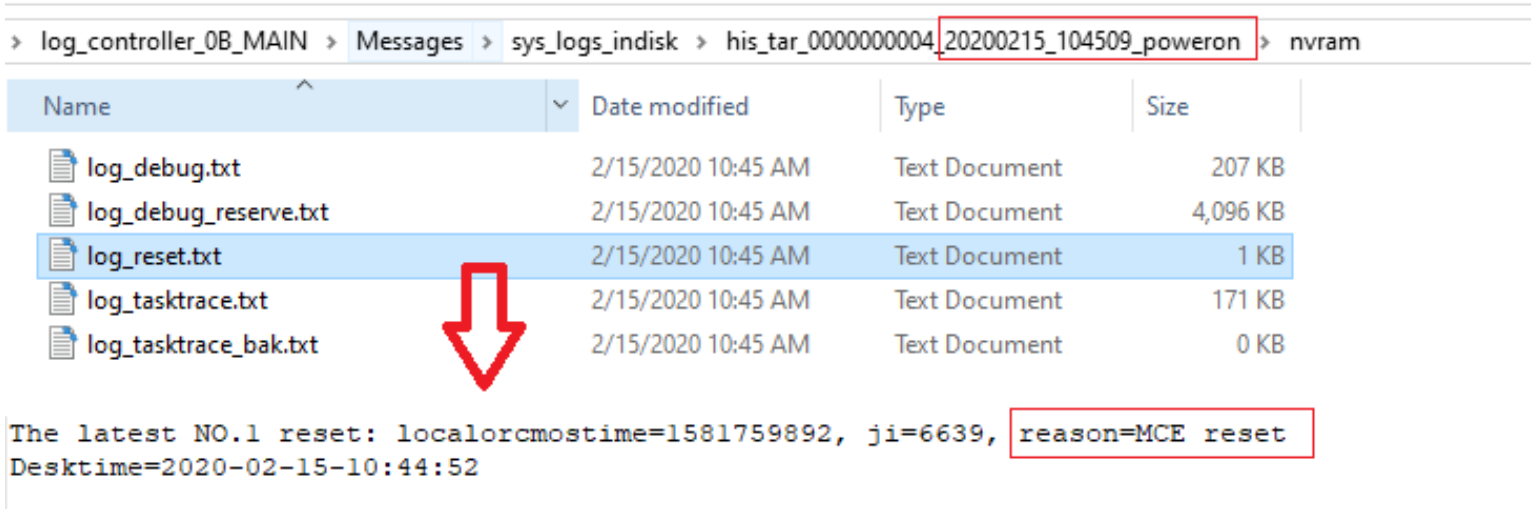
Basic Log Analysis(Continue)

✓Check abnormal reset



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Query and Set Network Configuration

- ✓ Query network configuration by “show port *XXX* …”, associate by TAB
- ✓ Change management and maintenance port configuration by “change system ma*XXX* …”
- ✓ Check port type(bond, logic), MTU, etc.

```
developer:/>show port general logic_type=Maintenance_Port
ETH port:
------------  Maintenance Port:------------

  ID                     Health Status  Running Status  Type             IPv4 Address    IPv6 Address  MAC               Role  Working
Rate(Mbps)  Enabled  Max Speed(Mbps)
  ---------------------  -------------  --------------  ---------------  --------------  ------------  ----------------  ----  --------
----------  -------  ---------------
  CTE0.SMM0.MAINTENANCE  Normal         Link Down       Maintenance Port  172.31.128.101  --            04:b0:e7:a8:3c:11  --    --
            Yes      1000
  CTE0.SMM1.MAINTENANCE  Normal         Link Down       Maintenance Port  172.31.128.102  --            04:b0:e7:a8:3c:13  --    --
            Yes      1000
developer:/>change system maintenance_ip eth_port_id=CTE0.SMM1.MAINTENANCE ip=10.220.6.12 mask=255.255.255.0
WARNING: You are about to change the IP address of the maintenance port. This operation will interrupt the connection between the mainten
ance engineer and the system.
Suggestion: Before you perform this operation, ensure that you have entered an available IP address.
Have you read warning message carefully?(y/n)y

Are you sure you really want to perform the operation?(y/n)y
Error: The specified IP address and the management network port's IP address reside on the same network segment.
Suggestion: Enter another IP address.
developer:/>
```

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Network Diagnose Command

“ip a” and “ifconfig”: check network configuration

“ip rule” and “route”: check route configuration

telnet: test specific port service status

ping: test network connectivity

“sshtoremoteExt *X*” or “sshtoremote: login other controller by heartbeat port

```
Storage: minisystem> ping -f -s 9000 -I eth-b1 10.220.6.71
PING 10.220.6.71 (10.220.6.71) from 10.220.6.91 eth-b1: 9000(9028) bytes of data.
..^
--- 10.220.6.71 ping statistics ---
26723 packets transmitted, 26722 received, 0% packet loss, time 15008ms
rtt min/avg/max/mdev = 0.483/0.508/2.105/0.027 ms, pipe 2, ipg/ewma 0.561/0.517 ms
Storage: minisystem> ip rule
0:      from all lookup local
1:      from 192.168.27.225 lookup 26384
100:    from 192.168.27.225 blackhole
101:    from 10.220.6.91 lookup 998
101:    from 172.31.128.101 lookup 996
32766:  from all lookup main
32767:  from all lookup default
Storage: minisystem>
```

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Network Capture

- tcpdump.sh
  - Only capture packet header, no content
  - Limited packet number to write file(avoid out of memory)
  - Print out the network capture for long term capture

```
Storage: minisystem> tcpdump.sh src 10.220.6.115 -i eth-b1
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on eth-b1, link-type EN10MB (Ethernet), capture size 64 bytes
19:23:01.454480 IP 10.220.6.115.51896 > 10.220.6.91.22: . ack 3921768283 win 255
19:23:01.509356 IP 10.220.6.115.51896 > 10.220.6.91.22: . ack 145 win 255
19:23:01.556212 IP 10.220.6.115.51896 > 10.220.6.91.22: . ack 273 win 254
19:23:01.591425 IP 10.220.6.115.52135 > 10.220.6.91.8088: P 3940353117:3940355746(2629) ack 4040524245 wi
19:23:01.591663 IP 10.220.6.115.51896 > 10.220.6.91.22: . ack 577 win 253
Storage: minisystem> tcpdump.sh src 10.220.6.115 -i eth-b1 -w test.pcap -c 16000
Command will run in the background, and the result will be saved to /OSM/coffer_log/log/tcpdump/test.pcap
tcpdump: listening on eth-b1, link-type EN10MB (Ethernet), capture size 64 bytes
Storage: minisystem>
```

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New Command for Dorado V6

In Dorado V6, all the network diagnose command encapsulated by “net.sh”

```
Storage: minisystem> net.sh ip rule
0:      from all oif vrf-inner lookup 100
0:      from all iif vrf-inner lookup 100
10:     from all lookup local
101:    from 172.31.128.102 lookup 996
101:    from 51.10.42.132 lookup 998
200:    from all oif vrf-srv lookup 101
200:    from all iif vrf-srv lookup 101
1000:   from all lookup [l3mdev-table]
32766:  from all lookup main
32767:  from all lookup default
```

```
Storage: minisystem> net.sh ifconfig eth4
eth4: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 51.10.42.132  netmask 255.255.224.0  broadcast 51.10.63.255
        inet6 2992::24  prefixlen 64  scopeid 0x0<global>
        inet6 fe80::aaf5:acff:fe25:926c  prefixlen 64  scopeid 0x20<link>
        ether a8:f5:ac:25:92:6c  txqueuelen 1000  (Ethernet)
        RX packets 38162671  bytes 3013521172 (2.8 GiB)
        RX errors 0  dropped 137475  overruns 0  frame 0
        TX packets 37640  bytes 2672972 (2.5 MiB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
```

```
Storage: minisystem> net.sh ip route show table 998
default via 51.10.32.1 dev eth4 onlink
51.10.32.0/19 dev eth4 proto kernel scope link src 51.10.42.132
172.31.0.0/16 dev eth4.4081 proto kernel scope link src 172.31.128.102
```

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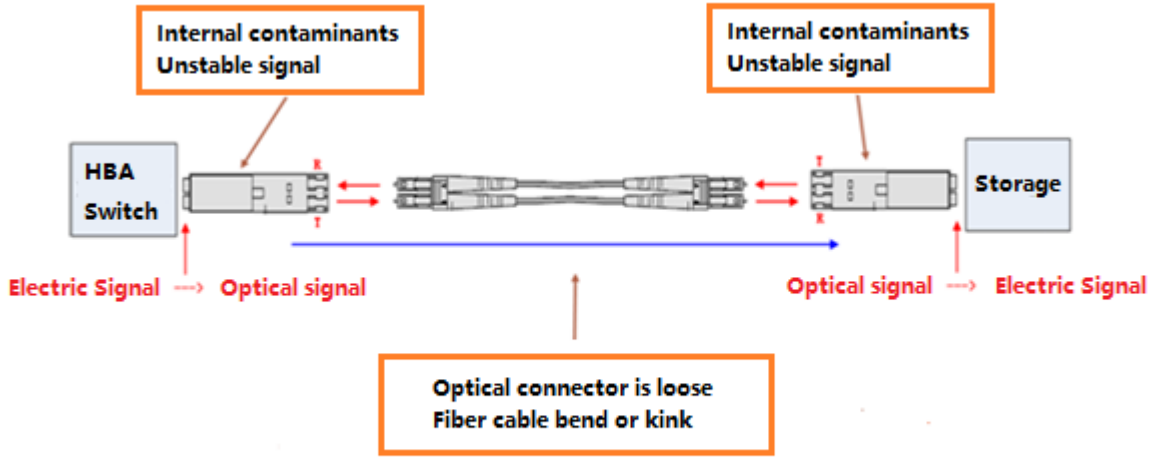
Sources of Bit Error

- Fibre cable quality
- SFP quality
- HBA/Connect board quality
- Compatility: for example, unsupported SFP, switch, etc.



Higher speed, higher signal quality

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FC Bit Error Diagnose

- Bit Error alarm trigger condition: bit error count increase in 3 continuous check cycles
- Basic diagnose process:
  - Check SFP TX and RX power, whether under 50% of normal SFP
    1. If TX power low, replace local SFP
    2. If RX power low, check remote SFP and fiber cable
  - Check the regularity of bit error
    - ✓ One port or multiple ports have bit error, maybe switch pass through issue frame without verification
    - ✓ Whether report alarm at specific period, maybe related to workload
  - Deep analyze storage log and SAN switch log

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Common Startup Failures

- Enter Rescue Mode
  - 3 abnormal reset in 30 minutes, like OOM reset, MCE reset, Oops reset, Watchdog reset, Panic reset, etc.
- Self-Check Failed
  - Hardware failure, like PSU, BBU, coffer disk failure, etc.
  - Incorrect SAS cabling
  - Plug out controllers at the same time, cause “dirty” cache loss
  - Inconsistent cluster configuration, for example, scale-out cluster only power on one controller enclosure

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Common Diagnose Process

- Check boot mode: showbootmode
  - resumebootmode
  - Collect log for root cause analysis
- Check fail reason of self-check
  - showsystrace/sys.sh showtrace
  - showsystrace *X*/sys.sh showtrace *X*
  - sys.sh showflowtrace

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Common Diagnose Process(Continue)

Storage: minisystem> **sys.sh showtrace**

admin:/diagnose>sys showtrace

Date Time	FlowId	Setup	RunCnt	FailCnt	Status
2020-09-01 16:42:26	**2**	**CLS_POWER_ON**	**1**	**1**	**Failure**
2020-09-01 16:42:34	5	CLS_LINK_CHECK	3	0	Success
2020-09-01 16:41:03	8	NODE_POWER_ON	1	0	Success

Storage: minisystem> **sys.sh showtrace 2**

admin:/diagnose>sys showtrace 2

CLS_POWER_ON :

TotalRunCnt	TotalFailCnt	CurStatus
1	1	Failure

Description:

Power on node bitmap(3).

id	date time	second	current trace
0000	**2020-09-01 16:42:26**	**206.601879**	**PowerOn: node clear failed info**

---> FAIL ACTION: RecoveryProfile: NtfClsUtil(CCDB DLM C-CLS)

Node: (1); Result: (4).

---> NODE POWER ON FAILED ERROR CODE INFO:

Node: (0); Controller Enslocure CTE0, Controller A; ErrCode: (0x4000C938).

Node: (1); Controller Enslocure CTE0, Controller B; ErrCode: (0x4000C938).

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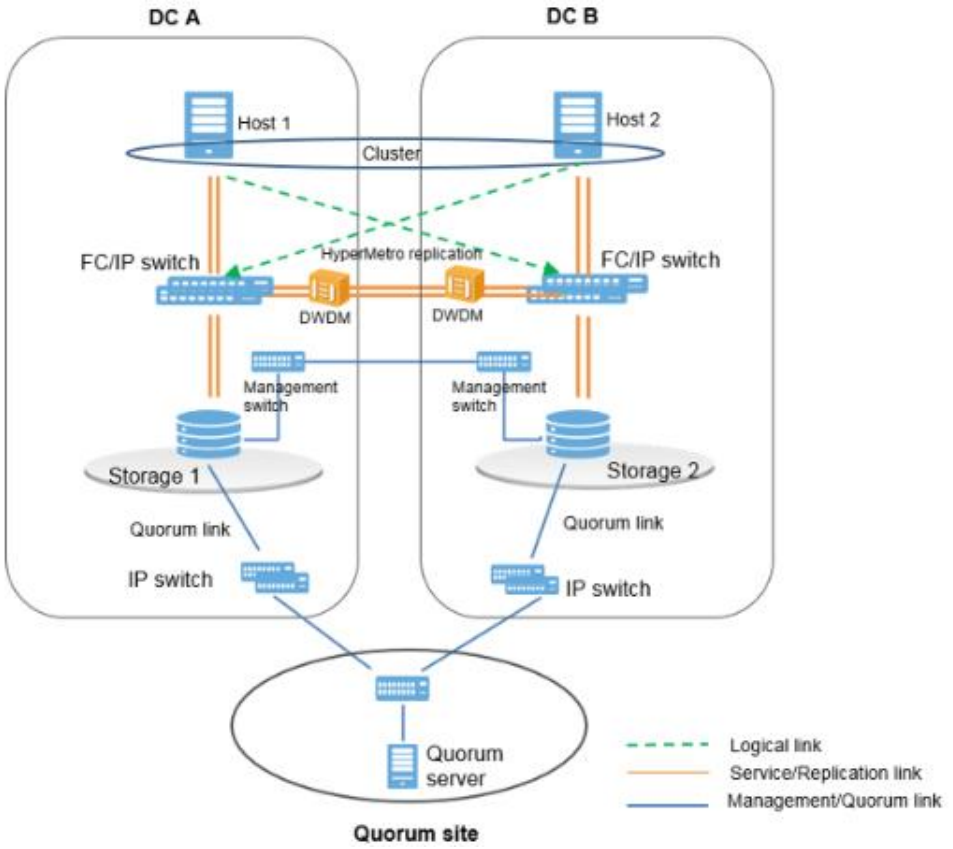
Understand HyperMetro Solution

- Isolated quorum network and replication network
  - Without quorum server or shared quorum/replication network will reduce service reliability
  - Dual quorum servers are working in active-standby mode, still need the standard networking
- HyperMetro load balance and local preferred mode
  - Decided by switchover mode on storage initiators for third-party multipathing
  - Decided by multipathing configuration for Huawei Ultrapath



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HyperMetro Pair Interruption

- Possible Reason
  - Replication network interruption
  - HyperMetro mirror write failed/timeout. For example, performance bottleneck, capacity used out.
- Collect log for HyperMetro pair interruption
  - All log for both of the storages to check the direct reason of interruption
  - Performance log for both of storages to check the performance statistics, possible bottleneck
  - Sometimes, also need host log, like VMware(vmsupport), Linux (/var/log/messages) to check error at host side

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HyperMetro Brain-Split

- Brain-split: the HyperMetro “cluster” can’t decide which node should continue service
  - Preferred site down in Static Priority Mode
  - Replication links and quorum links disconnected within 60 seconds in Quorum Mode. For example, after replication link, preferred site request arbitration immediately, non-preferred site request arbitration delayed. If the quorum links down, before arbitration result answered, both sites stop service because of brain-split.
  - Data still consistency in brain-split status
- Force synchronize the HyperMetro pair after confirm brain-split
  - Both sites are preferred site or non-preferred site is not brain-split
  - **Need to confirm with Huawei support before restore the pair**

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Thank you.

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