

Fujitsu & Keysight Joint Interoperability Test

114y LAB

Introduction



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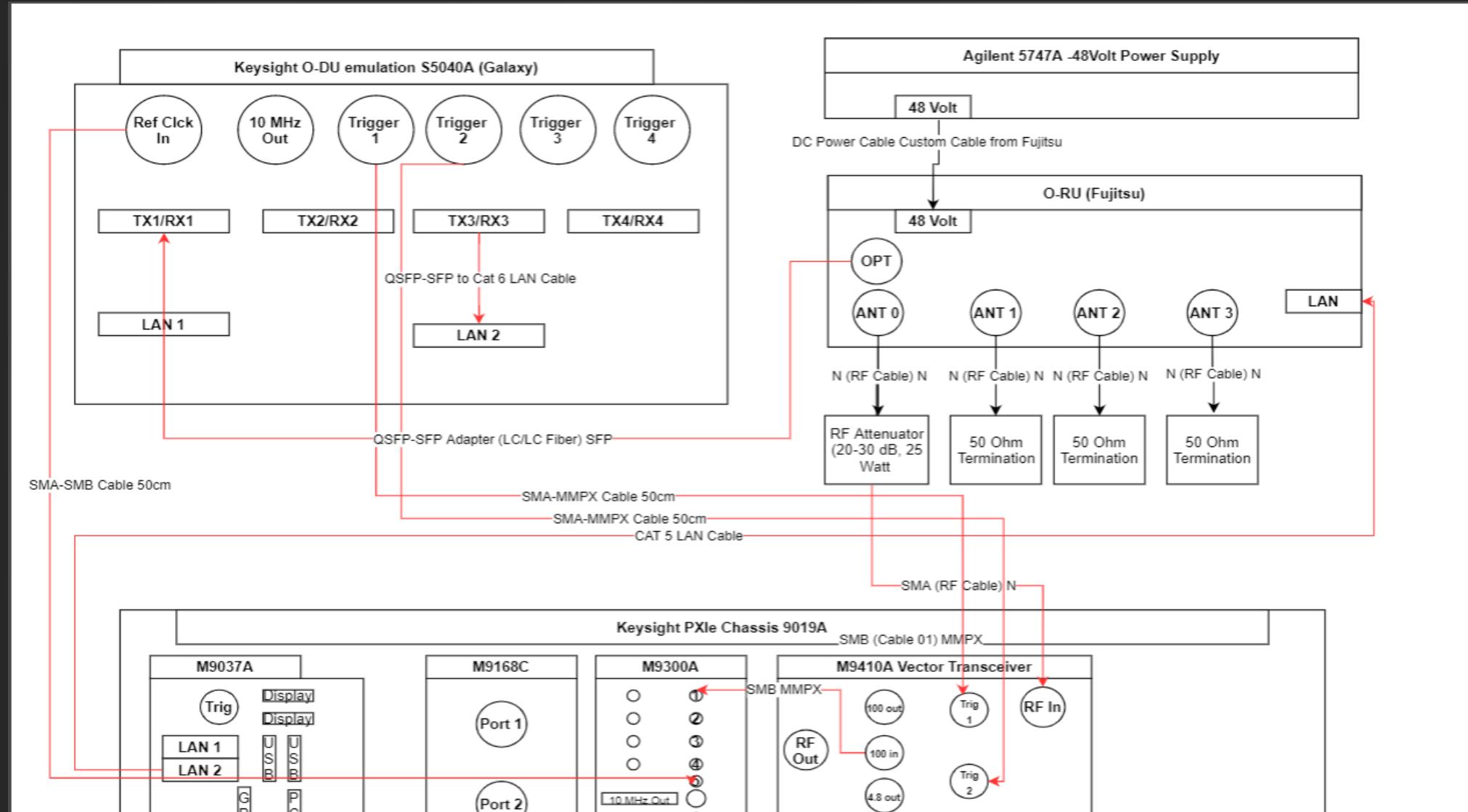
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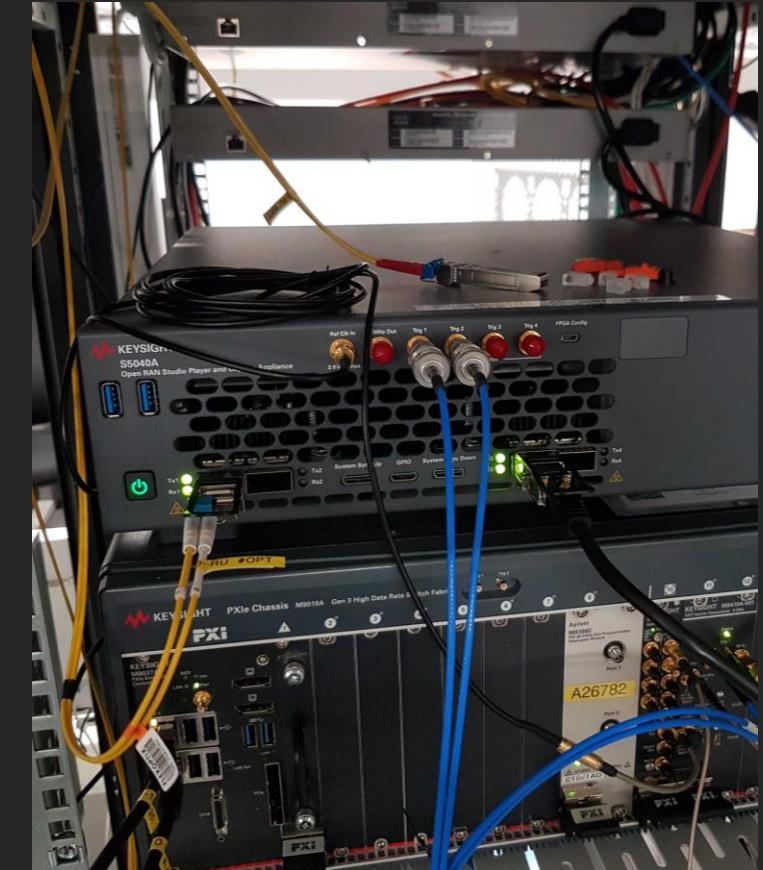
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Test Environment and Configuration



Topology for Live Demo



Test Purpose

- ✓ O-RAN Fronthaul configuration between O-DU emulator and O-RU
 - S-Plane – Configuration and verify the functional test of RU using ITU-T G8275.1 synchronization.
 - M-Plane – Configuration and verify operation after standard start-up
 - C/U- Plane – Configuration and verify eCPRI protocol
- ✓ O-RAN Fronthaul conformance and IoT Test
 - C/U Plane – To validate RF performance and timing of 5G NR signals
 - M-Plane – To validate fault management and alarm notification
- ✓ Hardware – to validate PTP/Sync loss in M-plane and alarm indicators on RU

Test Procedure & Result/ Live Demo

- ✓ O-RAN Fronthaul configuration between O-DU emulator and O-RU

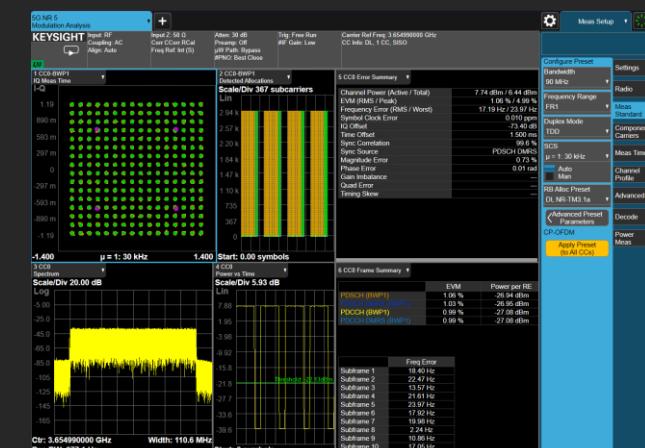
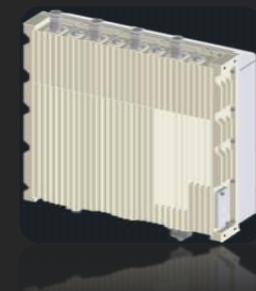
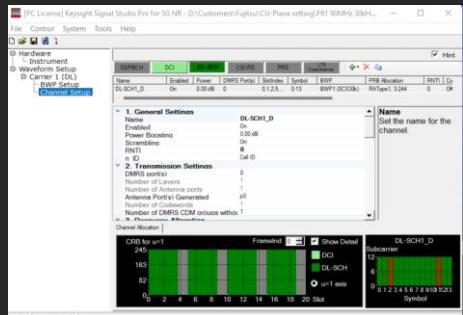
The image displays three windows from the Keysight Open RAN Studio software:

- Left Window (C-Plane Builder):** Shows the "Counters and KPIs" tab with counters like Rx Bytes (1,457), Rx Packets (18), and Tx Packets (3,848). The "Port Status" table shows QSFN Port, Description, Link, Configuration, Link Speed, FEC, Tx Packets, Rx Packets, and CRC Errors. A circled "PTP Status" section indicates "Master". Below it, a "PTP Tx" entry shows address 64708 and a "PTP Rx" entry shows address 8295.
- Middle Window (C-Plane Builder):** Displays a detailed log of XML configuration messages sent at 2022-02-21 13:11:49. One message is highlighted with a red box containing the XML snippet:


```
<edit-config xmlns="urn:ietf:params:xml:ns:netconf:base:1.0" message-id="26">
  <target>
    <default-operation>merge</default-operation>
    <config>
      <user-plane-configuration xmlns="urn:o-ran:uplane-conf:1.0">
        <low-level-tx-endpoints>
          <name>Low-Level-Tx-Endpoint-0</name>
          <compression>
            <compression-type>STATIC</compression-type>
            <bitdepth>14</bitdepth>
            <exponent></exponent>
            <frame-structure>193</frame-structure>
            <type>NORMAL</type>
            <cp-length>88</cp-length>
            <cp-length-other>72</cp-length-other>
            <offset-to-absolute-frequency-center>-3276</offset-to-absolute-frequency-center>
            <number-of-prb-per-scs>
              <sccs>KHz_30</sccs>
              <number-of-prb>273</number-of-prb>
            </number-of-prb-per-scs>
          </compression>
          <e-axcid>
            <e-du-port-bitmask>49152</e-du-port-bitmask>
            <e-band-sector-bitmask>16128</e-band-sector-bitmask>
            <ccid-bitmask>240</ccid-bitmask>
            <cru-port-bitmask>15</cru-port-bitmask>
            <eaxc-id>0</eaxc-id>
            <e-axcid>
              <low-level-tx-endpoints>
```
- Right Window (C-Plane Builder):** Shows U-Plane (DL: 2) and C-Plane (DL: 1) message details. The U-Plane section lists messages like 34642 (Q1_L1_T, 80.09.02.0F.08.01, 34 FE 9E 19 2A E9, AE FE, 1496 bytes, SGP_U-Plane, Frame 181). The C-Plane section lists messages like 34152 (Q1_L1_T, 80.09.02.0F.08.01, 34 FE 9E 19 2A E9, AE FE, 60 bytes, SGP_C-Plane, Section Typ). Below these are hex payloads and waveform plots.

Test Procedure & Result/ Live Demo

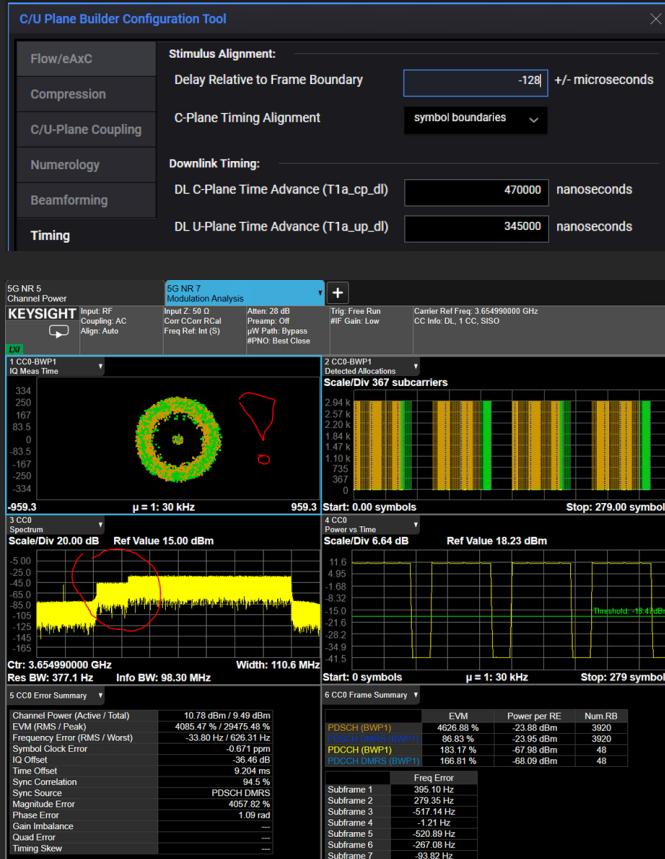
✓ RF Conformance Test



Test Procedure & Result/ Live Demo

- ✓ O-RAN Fronthaul conformance and IoT Test

- ✓ Hardware



```

1716 2022-02-23 12:12:30 DEBUG NetconfClientSession(sid:4): Received rpc-reply message-id: 59
1717 2022-02-23 12:12:30 INFO Waiting for Supervision Notification (urn:o-ran:supervision:1.0)supervisio
1718 2022-02-23 12:12:39 DEBUG Received message:
1719 <notification xmlns="urn:ietf:params:xml:ns:netconf:notification:1.0">
1720   <eventTime>2022-02-23T19:13:17Z</eventTime>
1721   <syncE-state-change xmlns="urn:o-ran:sync:1.0">
1722     <syncE-state>UNLOCKED</syncE-state>
1723   </syncE-state-change>
1724 </notification>
1725
1726 2022-02-23 12:12:54 DEBUG Received message:
1727 <notification xmlns="urn:ietf:params:xml:ns:netconf:notification:1.0">
1728   <eventTime>2022-02-23T19:13:31Z</eventTime>
1729   <alarm-notif xmlns="urn:o-ran:fm:1.0">
1730     <fault-id>1203</fault-id>
1731     <fault-source>37L4C-RRU</fault-source>
1732     <affected-objects>
1733       <name>37L4C-RRU</name>
1734     </affected-objects>
1735     <fault-severity>MAJOR</fault-severity>
1736     <is-cleared>false</is-cleared>
1737     <fault-text>Fronthaul Synchronization Error</fault-text>
1738   <event-time>2022-02-23T19:13:31+00:00</event-time>
1739   </alarm-notif>
1740 </notification>
1741
1742 2022-02-23 12:12:54 DEBUG NetconfClientSession(sid:4): Received notification : (urn:o-ran:fm:1.0)al
1743 2022-02-23 12:12:54 SUCCESS Fault Alarm Notification Received from RU
1744 2022-02-23 12:12:54 RESULT Subscription to Notification , pass
1745 2022-02-23 12:12:54 RESULT O-RU Alarm Notification Generation , pass
1746 2022-02-23 12:12:54 RESULT Retrieval of Active Alarm List , pass

```

```

f_5g_du_lls05G_DU:~$ du -ifstat ptp
DU interface status information
Time : 2022/02/23 19:21:53
S-plane information
Current S-plane Port Number : Not Available
Current S-plane Port Number : 24
PTP Multicast Mac Address : 01-1B-19-00-00-00
Current PTP Clock Class : Less than ?
SyncE Lock State : UnLocked
PTP Status : FreeRun
SyncE Lock State : UnLocked
f_5g_du_lls05G_DU:~$ du -stat
DU status information
Time : 2022/02/23 19:22:14
Restart cause : Supervision-Watchdog
Hardware State : Description
administrative : Unlocked
operational : Enabled
idle : Idle
availability : Degraded
energy-saving : Awake
Extended State
LED1 state : Red Blinking
LED2 state : Green On
Temperature state : 41 degree Celsius
Fault State : Major
Fault Active List
Software fault : None
Initialization failure : None
Fronthaul Synchronization Error : Active
Module Clock Faulty : None
Fronthaul faulty by Port1 : None
Unit out of order : None
RF module fault : None
TX out of order : None
RX out of order : None
911 port abnormal : None
Temperature too low : None
Unit dangerously overheating : None
NTP sync detected : None
RAN sync alarm : None
Cooling fan broken FAN1 : None
Cooling fan broken FAN2 : None
Cooling fan broken FAN3 : None
Cooling fan broken FAN4 : None
Cooling fan broken FAN5 : None
SFP Error : None
BBU Sync Safe : None
815G PS alarm : None
Tx Sleep : None
Tx OFF : None
Power Mode : None
Power alarm : None
Stop RF transmission by SyncE/PTP : Active
Cause of Stop
Clock quality of SyncE is low : Active
Clock quality of PTP is low : Active
PTP state : UnLock
Clock quality of SyncE is low : Active
Clock quality of PTP is low : Active
PTP state : Active

```

Thank you