M-plane Configuration Management

1.0 Prerequisites

Following steps are necessary for successful configuration of the RU.

1.1 Connection establishment using call-home procedure

Expected outcome is that the RU obtained IP address and client IP using DHCP. Default username and password are: - Username: oranuser - Password: o-ran-password

1.2. User provisioning and access management (mandatory only once)

Create at least one new user with edit-config using following message:

```
<nc:config xmlns:nc="urn:ietf:params:xml:ns:netconf:base:1.0">
    <users xmlns="urn:o-ran:user-mgmt:1.0">
        <user>
            <name>MPLANEUSER0</name>
            <account-type>PASSWORD</account-type>
            <password>12345678</password>
            <enabled>true</enabled>
        </user>
    </users>
</nc:config>
```

Configure access rules for that user using following message:

```
<nc:config xmlns:nc="urn:ietf:params:xml:ns:netconf:base:1.0">
    <nacm xmlns="urn:ietf:params:xml:ns:yang:ietf-netconf-acm">
        <groups>
            <group>
                <name>sudo</name>
                <user-name>MPLANEUSER0</user-name>
            </group>
        </groups>
    </nacm>
</nc:config>
```

After user provisioning RU needs to be rebooted for changes to take effect. Also, recovery user with default credentials will not be available anymore after reboot.

Default stream can be used to configure subscription to notifications:

```
<create-subscription xmlns="urn:ietf:params:xml:ns:netconf:notification:1.0">
    <stream>NETCONF</stream>
</create-subscription>
```

Watchdog supervision:

```
<supervision-watchdog-reset xmlns="urn:o-ran:supervision:1.0">
    <supervision-notification-interval>60</supervision-notification-interval>
    <guard-timer-overhead>10</guard-timer-overhead>
</supervision-watchdog-reset>
```

1.3 Getting capabilites and details

Following getters are important for correctly configuring the radio:

1.3.1 Interfaces - MAC address of eth1

```
<nget xmlns="urn:ietf:params:xml:ns:netconf:base:1.0">
    <filter xmlns:if="urn:ietf:params:xml:ns:yang:ietf-interfaces" type="xpath" select="/if:*//."/>
    <with-defaults xmlns="urn:ietf:params:xml:ns:yang:ietf-netconf-with-defaults">report-all</with-defaults>
</get>
```

1.3.2 Uplane capabilites

```
<get xmlns="urn:ietf:params:xml:ns:netconf:base:1.0">
    <filter xmlns:o-ran-uplane-conf="urn:o-ran:uplane-conf:1.0" type="xpath" select="/o-ran-uplane-conf:*//."/>
    <with-defaults xmlns="urn:ietf:params:xml:ns:yang:ietf-netconf-with-defaults">report-all</with-defaults>
</get>
```

1.3.3 RU delay profile (needed for CUS Plane configuration)

```
<get xmlns="urn:ietf:params:xml:ns:netconf:base:1.0">
    <filter xmlns:o-ran-delay="urn:o-ran:delay:1.0"
            type="xpath"
            select="/o-ran-delay:delay-management/o-ran-delay:bandwidth-scs-delay-state//."/>
    <with-defaults xmlns="urn:ietf:params:xml:ns:yang:ietf-netconf-with-defaults">report-all</with-defaults>
</get>
```

2.0 RU configuration

Configuration per YANG modules are given along with values that should be configured for default working configuration. Configuration should go in the following order:

1. Interfaces
2. Processing element
3. Low level endpoints
4. TX and RX array carriers
5. Low level links

2.1 o-ran-interfaces.yang

To use separate VLAN for U-plane, subinterface must be created on the main interface (eth1). Subinterface must be named as eth1.X where X is a numerical (VLAN ID).

```
<config xmlns:nc="urn:ietf:params:xml:ns:netconf:base:1.0">
  <interfaces xmlns="urn:ietf:params:xml:ns:yang:ietf-interfaces">
    <interface>
      <name>eth1.100</name>
      <type xmlns:ianaift="urn:ietf:params:xml:ns:yang:iana-if-type">ianaift:l2vlan</type>
      <enabled>true</enabled>
      <base-interface xmlns="urn:o-ran:interfaces:1.0">eth1</base-interface>
      <mac-address xmlns="urn:o-ran:interfaces:1.0">8C:1F:64:C5:60:25</mac-address>
      <vlan-id xmlns="urn:o-ran:interfaces:1.0">100</vlan-id>
    </interface>
  </interfaces>
</config>
```

2.2 o-ran-processing-element.yang

For processing element configuration, interface name must be the name of the subinterface created in the previous step (eth1.100 in this case).

Leaf Name	Value	Note
/processing-elements/ru-elements/name	ru-element-1	
/processing-elements/ru-elements/transport-flow/interface-name	eth1.100	
/processing-elements/ru-elements/transport-flow/eth-flow/ru-mac-address	8c:1f:64:c5:60:25	Should be changed with the address retrieved by “get” filtered over /interfaces
/processing-elements/ru-elements/transport-flow/eth-flow/vlan-id	100	
/processing-elements/ru-elements/transport-flow/eth-flow/o-du-mac-address	98:03:9b:9a:7e:da	Replace with your own DU MAC address

2.3 o-ran-uplane-conf.yang

This represents default 2x2 configuration. There should be one TX and one RX carrier, two TX and 4 RX endpoints, two TX and 4 RX links. Names of endpoints and links are indicated with "/", e.g., tx-link-1/2, so all values that are expressed with "/" are associated with corresponding names. For example: tx-endpoint-1 with eaxc-id of 0, and tx-endpoint-2 with eaxc-id of 1. TX and RX endpoints 1 and 2 are used for data transmission, and they have to use same eaxc-id set (e.g., 0 and 1), while RX endpoints 3 and 4 are used for PRACH, and they have to use different eaxc-id set (e.g., 2 and 3).

2.3.1 Low level TX and RX endpoint configuration

Leaf Name	Value	Note
/user-plane-configuration/low-level-tx-endpoints/name	tx-endpoint-1/2	
/user-plane-configuration/low-level-tx-endpoints/compression/iq-bitwidth	16	No compression. All compression parameters must be the same, for all endpoints (both TX and RX)
/user-plane-configuration/low-level-tx-endpoints/compression/compression-type	STATIC	
/user-plane-configuration/low-level-tx-endpoints/compression/compression-method	NO_COMPRESSION	For other iq-bitwidth it is BLOCK_FLOATING_POINT
/user-plane-configuration/low-level-tx-endpoints/frame-structure	193	
/user-plane-configuration/low-level-tx-endpoints/cp-length	352	
/user-plane-configuration/low-level-tx-endpoints/cp-length-other	288	
/user-plane-configuration/low-level-tx-endpoints/offset-to-absolute-frequency-center	0	
/user-plane-configuration/low-level-tx-endpoints/number-of-prb-per-scs/scs	KHZ_30	
/user-plane-configuration/low-level-tx-endpoints/number-of-prb-per-scs/number-of-prb	106	
/user-plane-configuration/low-level-tx-endpoints/e-axcid/o-du-port-bitmask	61440	
/user-plane-configuration/low-level-tx-endpoints/e-axcid/band-sector-bitmask	3840	
/user-plane-configuration/low-level-tx-endpoints/e-axcid/ccid-bitmask	240	
/user-plane-configuration/low-level-tx-endpoints/e-axcid/ru-port-bitmask	15	
/user-plane-configuration/low-level-tx-endpoints/e-axcid/eaxc-id	0/1	Maximum value is 15
/user-plane-configuration/low-level-rx-endpoints/name	rx-endpoint-1/2/3/4	
/user-plane-configuration/low-level-rx-endpoints/compression/iq-bitwidth	16	No compression. All compression parameters must be the same, for all endpoints (both TX and RX)
/user-plane-configuration/low-level-rx-endpoints/compression/compression-type	STATIC	
/user-plane-configuration/low-level-rx-endpoints/compression/compression-method	NO_COMPRESSION	For other iq-bitwidth it is BLOCK_FLOATING_POINT
/user-plane-configuration/low-level-rx-endpoints/frame-structure	193	
/user-plane-configuration/low-level-rx-endpoints/cp-length	352	

Leaf Name	Value	Note
/user-plane-configuration/low-level-rx-endpoints/cp-length-other	288	
/user-plane-configuration/low-level-rx-endpoints/offset-to-absolute-frequency-center	0	
/user-plane-configuration/low-level-rx-endpoints/number-of-prb-per-scs/scs	KHZ_30	
/user-plane-configuration/low-level-rx-endpoints/number-of-prb-per-scs/number-of-prb	106	
/user-plane-configuration/low-level-rx-endpoints/e-axcid/o-du-port-bitmask	61440	
/user-plane-configuration/low-level-rx-endpoints/e-axcid/band-sector-bitmask	3840	
/user-plane-configuration/low-level-rx-endpoints/e-axcid/ccid-bitmask	240	
/user-plane-configuration/low-level-rx-endpoints/e-axcid/ru-port-bitmask	15	
/user-plane-configuration/low-level-rx-endpoints/e-axcid/eaxc-id	0/1/2/3	Maximum value is 15

2.3.2 TX and RX array carriers configuration

Leaf Name	Value	Note
/user-plane-configuration/tx-array-carriers/name	tx-cc0	
/user-plane-configuration/tx-array-carriers/center-of-channel-bandwidth	3651780000	
/user-plane-configuration/tx-array-carriers/channel-bandwidth	40000000	
/user-plane-configuration/tx-array-carriers/active	false	
/user-plane-configuration/tx-array-carriers/type	NR	
/user-plane-configuration/tx-array-carriers/gain	23.0	
/user-plane-configuration/tx-array-carriers/downlink-radio-frame-offset	0	
/user-plane-configuration/tx-array-carriers/downlink-sfn-offset	0	
/user-plane-configuration/rx-array-carriers/name	rx-cc0	
/user-plane-configuration/rx-array-carriers/center-of-channel-bandwidth	3651780000	
/user-plane-configuration/rx-array-carriers/channel-bandwidth	40000000	
/user-plane-configuration/rx-array-carriers/active	false	
/user-plane-configuration/rx-array-carriers/type	NR	
/user-plane-configuration/rx-array-carriers/downlink-radio-frame-offset	0	
/user-plane-configuration/rx-array-carriers/downlink-sfn-offset	0	
/user-plane-configuration/rx-array-carriers/gain-correction	0.0	

Leaf Name	Value	Note
/user-plane-configuration/rx-array-carriers/n-ta-offset	0	

2.3.3 Low level TX and RX links configuration

Leaf Name	Value	Note
/user-plane-configuration/low-level-tx-links/name	tx-link-1/2	
/user-plane-configuration/low-level-tx-links/tx-array-carrier	tx-cc0	
/user-plane-configuration/low-level-tx-links/low-level-tx-endpoint	tx-endpoint-1/2	
/user-plane-configuration/low-level-tx-links/processing-element	ru-element-1	
/user-plane-configuration/low-level-rx-links/name	rx-link-1/2/3/4	
/user-plane-configuration/low-level-rx-links/rx-array-carrier	rx-cc0	
/user-plane-configuration/low-level-rx-links/low-level-rx-endpoint	rx-endpoint-1/2/3/4	
/user-plane-configuration/low-level-rx-links/processing-element	ru-element-1	