

Contribution to 3GPP TS 28.541 V16.1.0

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Introduction

The [O-RAN Alliance](#) and the [O-RAN-Software Community](#) specifying and developing and implementing a couple of management and control interfaces which are aligned with [3GPP](#) specifications. In accordance with the O-RAN Operation and Maintenance [Architecture](#) v1 and [Interface Specification](#) v1, for the O1 Interface, a data model for the protocol [NetConf](#) is required. 3

In June 2019, 3GPP published the Network Resource Model ([TS 28.541 version 16.1.0](#)). This model includes yang specification, which could/should be used by O-RAN Alliance and O-RAN-SC.

The yang modules were separated from the word document to be analyzed further (

[OAM-9](#) - Getting issue details... [STATUS](#)).

Please consider this page as preparation for feedback, liaison, contribution to 3GPP.

Formal

Yang validation

Each published yang should be validated using the tool [pyang](#). The community ususally takes care, that the yang modules also valid to be used by ONOS yang tools, OpenDaylight yang tools, Netopeer and other NetConf client and server implementations.

The minium requirement would be that pyang does not report errors and warnings when using the "--strict" option. However, it would be preferred that pyang also does not report errors and warnings, when using the "--lint" option.

```
pyang --strict *.yang ( minimum: no errors, no warnings)
pyang --lint *.yang (preferred: no errors, no warnings)
```

Providing yang modules

Public access to yang modules would be very benifical, avoiding error prune and time consuming extraction from word documents.

- <https://github.com/YangModels/yang>
- <http://www.netconfcentral.org>
- and of cause the related 3GPP TS page

... are good candidates to publish agreed and reviewed 3GPP yang modules.

License statement

Please add the 3GPP License statement to the yang modul description statement.

TS 28.541 v16.1.0 example	Proposal
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<pre> module ngran { namespace "urn:3gpp:tsg:sa5:nrm:nggran"; prefix "nggran"; import ManagedElement { prefix me; revision-date "2018-07-31"; } include ngran-nRCellCU; include ngran-nRCellDU; include ngran-nRSectorCarrier; include ngran-gNBDFunction; include ngran-gNBCUCPFunction; include ngran-gNBCUUPFunction; organization "3gpp SA5"; description "Main YANG module for the NRM NG-RAN Defined gNB as ManagedElement (subclass of ME) for overaching all other functions supported ngran Define constituted MFs and EPs as container in submodule"; </pre>	<pre> module ngran { namespace "urn:3gpp:tsg:sa5:nrm:nggran"; prefix "nggran"; import ManagedElement { prefix me; revision- date "2018-07-31"; } include ngran-nRCellCU; include ngran-nRCellDU; include ngran-nRSectorCarrier; include ngran-gNBDFunction; include ngran-gNBCUCPFunction; include ngran-gNBCUUPFunction; organization "3gpp SA5"; description "Main YANG module for the NRM NG-RAN Defined gNB as ManagedElement (subclass of ME) for overaching all other functions supported ngran Define constituted MFs and EPs as container in submodule Copyright 2019 3GPP. All rights reserved. Licensed under the Apache License, Version 2.0 (the 'License'); you may not use this file except in compliance with the License. You may obtain a copy of the License at http://www.apache.org/licenses/LICENSE-2.0 Unless required by applicable law or agreed to in writing, software distributed under the License is distributed on an 'AS IS' BASIS, WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied. See the License for the specific language governing permissions and limitations under the License."; </pre>
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YANG mechanics

Revision in import statements

The "revision date" in yang import statements should be avoided to gain more flexibility, when the imported yang module is update. It avoids updates of the importing yang model.

TS 28.541 v16.1.0 example	Proposal
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```

submodule ngc-UDRFunction {

    belongs-to ngc { prefix ngc; }

    import EP_RP { prefix ep-rp; revision-date "2018-07-31"; }
    import ManagedFunction { prefix mf; revision-date "2018-07-31"; }
    import nrm-types-3gpp { prefix nrm-type; revision-date "2018-07-31"; }
    import ietf-inet-types { prefix inet; revision-date "2010-09-24"; }
}

```

```

submodule ngc-UDRFunction {

    belongs-to ngc { prefix ngc; }

    import EP_RP { prefix ep-rp }
    import ManagedFunction { prefix mf }
    import nrm-types-3gpp { prefix nrm-type }
    import ietf-inet-types { prefix inet }
}

```

Yang submodules vs. Yang augment statement.

The usage of submodules and include statements create a monolithic interface description block - from developer point of view.

To address the expected high dynamic in 5G features and its OAM modules, Each submodule should be changed to a full module augmenting its parent module.

YANG content

Vendor specific container

The yang module "Vendor specific data container" is not needed, because each vendor (and operator) can augment each yang module to address vendor specific features. This yang feature makes such vendor specific data container model obsolete. Please note that other schemas may still require such model.

TODOs

- TS 28.541 specifies the actual plugged equipment search for required/expected/planned equipment.
- Check where the topology is defined between CU, DU and RU.