A YANG Data Model for Microwave Radio Link
draft-mwdt-ccamp-mw-yang-00

Abstract

This document defines a YANG data model in order to control and manage the radio link interfaces, and the connectivity to packet (typically Ethernet) interfaces in a microwave/millimeter wave node.

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1. Terminology and Definitions

The following terms are used in this document:

Carrier Termination (CT) is an interface for the capacity provided over the air by a single carrier. It is typically defined by its transmitting and receiving frequencies.

Radio Link Terminal (RLT) is an interface providing packet capacity and/or TDM capacity to the associated Ethernet and/or TDM interfaces in a node and used for setting up a transport service over a microwave/millimeter wave link.

The following acronyms are used in this document:

ACM Adaptive Coding Modulation

ATPC Automatic Transmit Power Control

CM Coding Modulation

CT Carrier Termination
2. Introduction

This document defines a YANG data model for management and control of the radio link interface(s) and the relationship to packet (typically Ethernet) and/or TDM interfaces in a microwave/millimeter wave node. The data model includes configuration and state data.

The design of the data model follows the framework for management and control of microwave and millimeter wave interface parameters defined in [I-D.mdt-ccamp-fmwk]. This framework identifies the need and the scope of the YANG data model, the use cases and requirements that the model needs to support. Moreover, it provides a detailed gap analysis to identify the missing parameters and functionalities of the existing and established models to support the specified use cases and requirements, and based on that recommends how the gaps should be filled with the development of the new model.

According to the conclusion of the gap analysis, the structure of the data model is based on the structure defined in [I-D.ahlberg-ccamp-microwave-radio-link] and it augments RFC 7223 to align with the same structure for management of the packet interfaces. More specifically, the model will include interface layering to manage the capacity provided by a radio link terminal for the associated Ethernet and TDM interfaces, using the principles for interface layering described in RFC 7223 as a basis.

The designed YANG data model uses the IETF: Radio Link Model [I-D.ahlberg-ccamp-microwave-radio-link] and the ONF: Microwave Modeling [ONF-model] as the basis for the definition of the detailed leaves/parameters, and proposes new ones to cover identified gaps which are analyzed in [I-D.mdt-ccamp-fmwk].

3. YANG Data Model (Tree Structure)

module: ietf-microwave-radio-link
augment /if:interfaces/if:interface:

  +++rw RLT-Config
  |
  | |---rw CT-Config
  |    | |---rw carrier-id?  string
  |    | |---rw tx-enabled?  boolean
  |    | |---rw tx-frequency?  uint32
  |    | |---rw rx-frequency?  uint32
  |    | |---rw duplex-distance?  uint32
  |    | |---rw duplex-config?  boolean
  |    | |---rw polarization?  enumeration
  |    | |---rw power-mode?  enumeration
  |    | |---rw selected-output-power?  power
  |    | |---rw coding-modulation-mode?  enumeration
  |    | |---rw selected-cm?  identityref
  |    | |---rw selected-min-acm?  identityref
  |    | |---rw selected-max-acm?  identityref
  |    | |---rw if-loop?  boolean

augment /if:interfaces-state/if:interface:

  +++ro RLT-State
  |
  | |---ro CT-State
  |
  | |---rw Protection-Config
  |
  | |---ro Protection-State
Note: the current version only includes model definitions of CT-Config, which does not form a complete model. More model definitions will be provided in the future versions.

4. YANG Module

<CODE BEGINS> file "ietf-microwave-radio-link.yang"

module ietf-microwave-radio-link {
    namespace "urn:ietf:params:xml:ns:yang:ietf-microwave-radio-link";
    prefix mrl;
    import ietf-yang-types {
        prefix yang;
    }
    import ietf-interfaces {
        prefix if;
    }
    import iana-if-type {
        prefix ianaift;
    }

    organization
        "IETF CCAMP Working Group";

    contact
        "jonas.ahlberg@ericsson.com"
description

"This is a module for the entities in a generic microwave system.";

revision 2016-10-29 {

description

"Draft revision.";

reference "";

}

/*
  * Features
  */

feature xpic {

description

"Indicates that the device supports XPIC.";

}

feature mimo {

description

"Indicates that the device supports MIMO.";
} */

/* Interface identities */

identity radio-link-terminal {
  base ianaift:iana-interface-type;
  description
    "Interface identity for a radio link terminal.";
}

identity carrier-termination {
  base ianaift:iana-interface-type;
  description
    "Interface identity for a carrier termination.";
}

} */

/* Coding and modulation identities */

identity coding-modulation {
  description
"The coding and modulation schemes."

}

/*
 * Typedefs
 */
typedef power {
type decimal64 {
   fraction-digits 1;
}
description
   "Type used for power values, selected and measured."
}

/*
 * Radio Link Terminal (RLT) - Configuration data nodes
 * to be filled
 */

/*
 * Carrier Termination (CT) - Configuration data nodes
augment "/if:interfaces/if:interface" {
  when "if:type = 'mrl:carrier-termination'";
  description
  "Addition of data nodes for carrier termination to the standard Interface data model, for interfaces of the type 'carrier-termination'.";

  leaf carrier-id {
    type string;
    default "A";
    description
    "ID of the carrier. (e.g. A, B, C or D) Used in multi carrier configuration, such as XPIC & MIMO configurations to check that the carrier termination is connected to the correct far-end carrier termination. Should be the same carrier ID on both sides of the hop. Defaulted when single carrier configuration.";
  }

  leaf tx-enabled {
    type boolean;
  }
}
description

"The administrative status of the transmitter. True (enable) or False (disable) or the transmitter. Only applicable when the interface is enabled (interface:enabled = true) otherwise it’s always disabled."

}

leaf tx-frequency {
    type uint32;
    units "kHz";
    default "0";
    description
        "Selected transmitter frequency."
}

leaf rx-frequency {
    type uint32;
    units "kHz";
    default "0";
    description
        "Selected receiver frequency."
leaf duplex-distance {
  type uint32;
  units "kHz";
  default "0";
  description
    "Distance between Tx & Rx frequencies. Only writeable when duplex-config=true and duplex-type=variable.";
}

leaf duplex-config {
  type boolean;
  default "false";
  description
    "Enable (true) or disable (false) configuration of rx-Frequency using a defined duplex distance.";
}
leaf polarization {
  type enumeration {
    enum "horizontal" {
      description "Horizontal polarization.";
    }
    enum "vertical" {
      description "Vertical polarization.";
    }
    enum "not-specified" {
      description "Polarization not specified.";
    }
  }
  default "not-specified";
  description
    "Polarization - A textual description for info only.";
}

leaf power-mode {
  type enumeration {
    enum rtpc {
      description "Remote Transmit Power Control (RTPC).";
    }
  }
}
enum atpc {
    description "Automatic Transmit Power Control (ATPC).";
}

description
    "A choice of Remote Transmit Power Control (RTPC)
    or Automatic Transmit Power Control (ATPC).";
}

leaf selected-output-power {
    when "../power-mode = 'rtpc'";
    type power;
    units "dBm";
    description
        "Selected output power in RTPC mode.";
}

leaf coding-modulation-mode {
    type enumeration {
        enum fixed {

description "Fixed coding/modulation.";
}

enum adaptive {
    description "Adaptive coding/modulation.";
}


leaf selected-cm {
    when "../coding-modulation-mode = 'fixed';
        type identityref {
            base coding-modulation;
        }
        description
            "Selected fixed coding/modulation.";
    }

leaf selected-min-acm {
    when "../coding-modulation-mode = 'adaptive';
type identityref {
    base coding-modulation;
}

description
"Selected minimum coding/modulation. Adaptive coding/modulation shall not go below this value.";
}

leaf selected-max-acm {
    when "../coding-modulation-mode = 'adaptive'";
    type identityref {
        base coding-modulation;
    }
    description
"Selected maximum coding/modulation. Adaptive coding/modulation shall not go above this value.";
}

leaf if-loop {
    type boolean;
}
default "false";

description
"Enable (true) or disable (false) the intermediate frequency (IF) loop, which loops the signal back to the client side (not the radio side).";
}

/*
* Radio Link Termination - state data nodes
* to be filled
*/

/*
* Carrier Termination - state data nodes
* to be filled
*/

/*
* Radio Link Protection - Configuration data nodes
* to be filled
*/

/*
* Radio Link Protection - state data nodes
* to be filled
*/
5. Security Considerations

The YANG module defined in this memo is designed to be accessed via the NETCONF protocol [RFC6241]. The lowest NETCONF layer is the secure transport layer and the mandatory-to-implement secure transport is SSH [RFC6242]. The NETCONF access control model [RFC6536] provides the means to restrict access for particular NETCONF users to a pre-configured subset of all available NETCONF protocol operations and content.

There are a number of data nodes defined in the YANG module which are writable/creatable/deletable (i.e., config true, which is the default). These data nodes may be considered sensitive or vulnerable in some network environments. Write operations (e.g., <edit-config>) to these data nodes without proper protection can have a negative effect on network operations.

The security considerations of [RFC7223] also apply to this document.
6. IANA Considerations

TBD.

7. References

7.1. Normative References


7.2. Informative References

[I-D.mdt-ccamp-fmwk]

[I-D.ahlberg-ccamp-microwave-radio-link]

[ONF-model]


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