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YANG module for LoRa Networks draft-pelov-yang-lora-01

Abstract

This document presents a YANG module definition for managing LoRa-based devices.

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[1.](#) Introduction

This document provides a YANG module description for managing a LoRa endpoints.

SemTech [[LoRa](#)] (c) is a low-rate, low-power, long-range radio technology. It could be used as a base radio technology for building Low-Rate Wide-Area Networks (LR-WAN), also known as LPWA (Low-Power Wide Area). SemTech [[LoRa](#)] (c) has the following characteristics:

- o Works in narrow, license-free (ISM) bands with good propagation properties (< 1GHz)
- o Low- to very-low throughput (270 bps--200 kbps)
- o Low-power operation (25 mW in Europe)
- o Far-Reaching communication capabilities (20 km with line-of-sight, several km in urban environment)
- o Strong channel access restrictions (1% to 10% duty cycling)

The management of LoRa-based devices can be done through a standard approach, compatible with the best network-operator practices, namely NETCONF or RESTCONF. A formal definition of the parameters and the values to be managed is thus required, which can be done with the YANG module language. The following document presents a YANG module definition for managing a LoRa-based end-device.

1.1. Requirements Language

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [RFC 2119](#) [[RFC2119](#)].

2. LoRa Data Model

The data model has the following structure for Lora configuration:

```

+- RW lora
  +- RW Lora Device
  +- RW Mode
  |   +- RW Channel Bandwidth      enumeration
  |   +- RW Coding Rate           enumeration
  |   +- RW Spreading Factor      int8
  +- Physical Layer
  |   +- RW Preamblelength        int32
  |   +- RW Channel Frequency Range enumeration
  |   +- RW Channel               int8
  |   +- RW SymbolTimeout         int32
  +- MAC Layer
  +- RW FrPayloadEncryption        boolean
  |   +- RW Delay                  int32
  |   +- RW FixlengthPayloadOn    boolean

```

The data model defines a state container Mode which includes the three principal characteristics of the LoRA interface which determine the parameters of the channel

Figure 1

3. LoRa YANG module

This model imports typedefs from [[RFC6991](#)].

```
<CODE BEGINS> file "ietf-pelov@2015-10-10.yang"
```

```

module lora {

    namespace "urn:lora";
    prefix lo;

    import ietf-interfaces {
        prefix if;
    }

```

```
    }

    organization
      "Acklio";

    contact
      "Alexander Pelov
      a@ackl.io";
      "Ana Minaburo
      ana@minaburo.com";

    description
      "This module contains a collection of YANG definitions for
      configuring the LORA () network interface.

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      Redistribution and use in source binary forms, with or
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      <!--This version of this YANG module is part of
      draft-pelov-yang-lora; see the draft itself for
      full legal notices.-->

      revision 2015-11-01 {
        description
          "Initial Description";
        reference
          "LoRa MAC Class A Specification R3.1 by Semtech";
      }

      grouping mode {
        leaf channel-bandwidth {
          type enumeration {
            enum 125 { value 0; }
            enum 150 { value 1; }
            enum 500 { value 2; }
          }
        }
      }

      leaf coding-rate {
        type enumeration {
          enum 4_5 { value 1; }
```



```
        enum 4_6 { value 2; }
        enum 4_7 { value 3; }
        enum 4_b { value 4; }
    }
}

leaf spreading-factor {
    type uint8 {
        range "6 .. 12";
    }
}

}

augment "/if:interfaces/if:interface" {
    // To be defined later
    when "if:type = 'ianaift:lora'";

    container lora {
        uses mode;
        container physical-layer {
            leaf preamble-length {
                type int32;
                default 7;
            }

            leaf channel-frequency-range {
                mandatory true;
                type enumeration {
                    enum europe;
                    enum usa;
                    enum japan;
                    enum china;
                }
            }

            leaf channel {
                type uint8 {
                    range "0..10";
                }
            }

            leaf symbol-timeout {
                type uint32;
            }
        }

        container mac-layer {
```



```
    leaf payload-encryption {
      type boolean;
      default "false";
    }

    leaf delay {
      type int32;
    }

    leaf fixed-length-payload {
      type boolean;
      default "false";
    }
  }
}
```

<CODE ENDS>

The data model defines a state container Mode which include the three principal characteristics of the LoRA interface which determine the parameters of the channel

Figure 2

4. Acknowledgements

5. IANA Considerations

This memo includes no request to IANA.

6. Security Considerations

All drafts are required to have a security considerations section.
See [RFC 3552](#) [[RFC3552](#)] for a guide. TO DO

7. References

7.1. Normative References

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", [BCP 14](#), [RFC 2119](#), DOI 10.17487/RFC2119, March 1997, <<http://www.rfc-editor.org/info/rfc2119>>.

7.2. Informative References

- [LoRa] Semtech, "<https://web.archive.org/web/20150510011904/https://www.semtech.com/wireless-rf/lora.html>", May 2015.
- [RFC3552] Rescorla, E. and B. Korver, "Guidelines for Writing RFC Text on Security Considerations", [BCP 72](#), [RFC 3552](#), DOI 10.17487/RFC3552, July 2003, <<http://www.rfc-editor.org/info/rfc3552>>.

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