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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;
```

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```
    }  
  
    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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<!--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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