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# A YANG Data Model for ~~UDP Tunnel~~ Attachment Circuit as a Service with UDP Tunnel Support

draft-jlu-dmm-udp-tunnel-acaas-00

## Abstract

Delivery of network services over a Layer 3 tunnel ~~bearer~~ assumes that the appropriate setup is provisioned over links that connect the customer termination points and a provider network. The required setup ~~needed~~ to allow successful data exchange over these links is referred to as an attachment circuit (AC) while the underlying link for carrying network services is referred to as "bearer", in this case a Layer 3 UDP tunnel.

This document specifies an extension for UDP tunnel as Layer 3 bearer to the YANG service data model for AC defined in ~~[~~ I-D.ietf-opsawg-teas-attachment-circuit~~]~~. .

**Commenté [MB1]:** Please consider some example to illustrate the use of the module. You may use an example that builds on an example in the accaas spec.

**Commenté [MB2]:** As the concept of bearer/AC are defined right after.

**Commenté [MB3]:** Avoid citations in the abstract

## Status of This Memo

This Internet-Draft is submitted in full conformance with the provisions of BCP 78 and BCP 79.

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## Copyright Notice

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## 1. Introduction

Connectivity services provided by networks to customers ensure the transfer of data between termination points ~~in the~~via ~~a~~ provider network. The objectives of the connectivity service can be negotiated and agreed between customers and network providers. To facilitate data transfer within ~~the~~ a provider network, it is assumed that the appropriate setup is provisioned over links that connect customer termination points and provider network (usually via Provider Edges (PEs)). This is referred to as attachment circuit (AC) and the underlying link defined in this document is a UDP tunnel as Layer 3 bearer. In general, a bearer can be described as a physical or logical link that connects a customer node (or site) to a provider network. [I-D.ietf-opsawg-teas-attachment-circuit] describes further details of bearers and 'Attachment Circuits'-as-a-service.

[I-D.ietf-opsawg-teas-attachment-circuit] ~~describes~~ specifies YANG data models for bearers and 'Attachment circuits'-as-a-service ACaaS~~)~~. Layer 3 UDP tunnel as bearer is not defined ~~there~~ in the ACaaS specification and is an extension defined in this document. Section 2 describes the ~~data module"~~ ietf-ac-udpt" YANG module for Layer 3 UDP tunnel service. Section 3 describes the UDP tunnel YANG data model.

**Commenté [MB4]:** I suggest you add service examples that requires such UDP tunnels. No need to be exhaustive.

## 2. Attachment Circuit for UDP Tunnel

[I-D.ietf-opsawg-teas-attachment-circuit] defines a YANG service model for AC ~~to an IETF slice [RFC9543]~~ based on layer 2 bearers. This document extends the YANG service model for AC in [I-D.ietf-opsawg-teas-attachment-circuit] to support UDP tunnels.

**Commenté [MB5]:** That's not specific to slicing.

The 'l3-service' and 'l3-tunnel-service' in the AC structure in [I-D.ietf-opsawg-teas-attachment-circuit] is used to configure the relevant layer 3 tunnel properties of a UDP tunnel AC. IPv4 and IPv6

properties of the UDP tunnel AC are provided in the "ip-connection" container (Section 5.2.5.2 of [I-D.ietf-opsawg-teas-attachment-circuit]). ~~and~~The ~~the~~ extension below adds source port number and range for the UDP tunnel.

The meanings of the symbols in the YANG tree diagram are defined in "YANG Tree Diagrams" [RFC8340].

```
module: ietf-ac-udpt

  augment /ac-svc:attachment-circuits/ac-svc:ac/ac-svc:ip-connection
          /ac-svc:l3-service/ac-svc:l3-tunnel-service
          /ac-svc:l3-tunnel-service:

    +--rw (udp-port)?
       +--:(port-range-or-operator)
          +--rw source-port-range-or-operator
             +--rw (port-range-or-operator)?
                +--:(range)
                |  +--rw lower-port    inet:port-number
                |  +--rw upper-port    inet:port-number
                +--:(operator)
                   +--rw operator?     operator
                   +--rw port          inet:port-number
```

Figure 1: UDP Tunnel Yang Module

'l3-tunnel-service' in Section 5.2.5.2 of [I-D.ietf-opsawg-teas-attachment-circuit] is extended in this document to ~~carry~~ specify UDP source port number or a~~/~~ range of port numbers.

Also, this document defines a new identity (called, ) based on the base identity 'l3-tunnel-type' defined in Section 4.2 of [ietf-opsawg-teas-common-ac].

**Commenté [MB6]:** Cite this one as a normative reference.

## 3. ietf-ac-udp-tunnel YANG Module

The "ietf-ac-udp-tunnel" module uses ~~definitions~~ types and groupings defined in [ietf-opsawg-teas-common-ac], [I-D.ietf-opsawg-teas-attachment-circuit], and [RFC8519].

<CODE BEGINS> file "ietf-ac-udp-tunnel@2025-09-18.yang"

```
module ietf-ac-udp-tunnel {
  yang-version 1.1;
  namespace "urn:ietf:params:xml:ns:yang:ietf-ac-udp-tunnel";
  prefix ac-udpt;

  import ietf-ac-common {
    prefix ac-common;
    reference
      "RFC ~~SSSS~~9833: A Common YANG Data Model for Attachment Circuits
~~YANG Data Models for Bearers and 'Attachment
                    Circuits'-as-a-Service (ACaaS)~~";
  }
```

```
  import ietf-ac-svc {
    prefix ac-svc;
    reference
      "RFC 9834SSSS: YANG Data Models for Bearers and 'Attachment
                  ____Circuits'-_as-_a-_Service (ACaaS)";
  }
  import ietf-packet-fields {
    prefix packet-fields;
      reference
        "RFC 8519: YANG Data Model for Network Access
                   Control Lists (ACLs), Section 4.2";
  }

  organization
    "IETF DMM (Distributed Mobility Management)";
  contact
    "WG Web:   <https://datatracker.ietf.org/wg/dmm/>
     WG List:  <mailto:dmm@ietf.org>

     Author:   John Kaippallimalil
               <mailto:john.kaippallimalil@futurewei.com>";
  description
    "This YANG module defines a YANG model for augmenting the ACaaS
     service model with UDP Encapsulation as Layer 3 tunnel service.

     Copyright (c) 2024-2025 IETF Trust and the persons identified as
     authors of the code.  All rights reserved.

     Redistribution and use in source and binary forms, with or
     without modification, is permitted pursuant to, and subject
     to the license terms contained in, the Revised BSD License
     set forth in Section 4.c of the IETF Trust's Legal Provisions
     Relating to IETF Documents
     (https://trustee.ietf.org/license-info).

     All revisions of IETF and IANA published modules can be found
     at the YANG Parameters registry group
     (https://www.iana.org/assignments/yang-parameters).

     This version of this YANG module is part of RFC XXXX; see the
     RFC itself for full legal notices.";

  revision 2025-09-182023-11-13 {
    description
      "Initial revision.";
    reference
      "RFC XXXX: UDP Attachment Circuit as a Service";
  }

  identity udp {
    base ac-common:l3-tunnel-type;
    description
      "UDP Encapsulation.";
    reference
      "RFC 8085: UDP Usage Guidelines, Section 3.1.11";
  }

  augment "/ac-svc:attachment-circuits/ac-svc:ac"
```

**Commenté [MB7]:** Update to mirror the update title of this document

```
            + "/ac-svc:ip-connection/ac-svc:l3-service"
            + "/ac-svc:l3-tunnel-service/ac-svc:l3-tunnel-service" {
          when "derived-from-or-self(./type, 'ac-udpt:udp')" {
            description
              "Only applicable if l3 service type is UDP
encapsualtionencapsulation.";
          }
          description
            "Augments Layer 3 AC service with required data nodes for
             UDP encapsulation support.";
           choice udp-port {
             description
               "Choice of specifying the source port number or referring
                to a group of port numbers.";
             container source-port-range-or-operator {
               description
                  "Indicates a set of source ports numbers.";
               uses packet-fields:port-range-or-operator;
            }
          }
        }
      }

<CODE ENDS>
```

Figure 2: UDP Tunnel YANG Module

Note to RFC Editor:

Replace "RFC XXXX" with the RFC number to be assigned to this document.

~~Replace "RFC SSSS" with the RFC number to be assigned to [I-D.ietf-opsawg-teas-attachment-circuit].~~

## 4. Acknowledgements

Mohamed Boucadair helped with Yang structures for the ietf-ac-udp-tunnel attachment circuit in this document.

## 5. Security Considerations

This section is modeled after the template described in Section 3.7 of [I-D.ietf-netmod-rfc8407bis].

The "ietf-ac-udp-tunnel" YANG module defines a data model that is designed to be accessed via YANG-based management protocols, such as NETCONF [RFC6241] and RESTCONF [RFC8040]. These protocols (1) have to use a secure transport layer (e.g., SSH [RFC4252], TLS [RFC8446] or QUIC [RFC9000] and (2) have to use mutual authentication.

Servers MUST verify that requesting clients are entitled to access and manipulate a given bearer or AC. For example, a given customer must not have access to bearers (attachment circuits) of other customers. The Network Configuration Access Control Model (NACM) [RFC8341] provides the means to restrict access for particular NETCONF or RESTCONF users to a preconfigured subset of all available NETCONF or RESTCONF protocol operations and content.

~~The data nodes in the YANG model in this document inherits from [I-D.ietf-opsawg-teas-attachment-circuit], and the security constraints to the data structures there apply.~~

There are a number of data nodes defined in this YANG module that are writable/creatable/deletable (i.e., "config true", which is the default). All writable data nodes are likely to be sensitive or vulnerable in some network environments. Write operations (e.g., edit-config) and delete operations to these data nodes without proper protection or authentication can have a negative effect on network operations. The following subtrees and data nodes have particular sensitivities/vulnerabilities:~~Data nodes defined in the ietf-ac-udp-tunnel YANG module 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) and delete operations to these data nodes without proper protection or authentication can have a negative effect on network operations.~~

~~- The~~ 'source-port-range-or-operator~~udp-port~~' information may be used to track a customer of ~~the~~ a ~~slice~~ service and may be considered a violation of the customer-provider trust relationship.

The data nodes in the YANG model in this document inherits from [I-D.ietf-opsawg-teas-attachment-circuit], and the security constraints to the data structures there apply.

## 6. IANA Considerations

IANA is requested to register the following URI in the "ns" subregistry within the "IETF XML Registry" [RFC3688]:

URI: urn:ietf:params:xml:ns:yang:ietf-ac-udp-tunnel

Registrant Contact: The IESG.

XML: N/A; the requested URI is an XML namespace.

IANA is requested to register the following YANG module in the "YANG Module Names" subregistry [RFC6020] within the "YANG parameters" registry.

Name: ietf-ac-udp-tunnel

Maintained by IANA? N

Namespace: urn:ietf:params:xml:ns:yang:ietf-ac-udp-tunnel

Prefix: ac-udp-tunnel

Reference: RFC XXXX

## 7. References

### 7.1. Normative References

**a mis en forme :** Français (France)

**Commenté [MB8]:** Please follow the latest sec template in RFC8407bis

**Commenté [MB9]:** Not specific to slicing

[I-D.ietf-opsawg-teas-attachment-circuit]
Boucadair, M., Roberts, R., de Dios, O. G., Barguil, S., and B. Wu, "YANG Data Models for Bearers and 'Attachment Circuits'-as-a-Service (ACaaS)", Work in Progress, Internet-Draft, draft-ietf-opsawg-teas-attachment-circuit-20, 23 January 2025, <https://datatracker.ietf.org/doc/html/draft-ietf-opsawg-teas-attachment-circuit-20>.

[RFC8519] Jethanandani, M., Agarwal, S., Huang, L., and D. Blair, "YANG Data Model for Network Access Control Lists (ACLs)", RFC 8519, DOI 10.17487/RFC8519, March 2019, <https://www.rfc-editor.org/info/rfc8519>.

[RFC3688] Mealling, M., "The IETF XML Registry", BCP 81, RFC 3688, DOI 10.17487/RFC3688, January 2004, <https://www.rfc-editor.org/info/rfc3688>.

[RFC6020] Bjorklund, M., Ed., "YANG - A Data Modeling Language for the Network Configuration Protocol (NETCONF)", RFC 6020, DOI 10.17487/RFC6020, October 2010, <https://www.rfc-editor.org/info/rfc6020>.

[RFC8341] Bierman, A. and M. Bjorklund, "Network Configuration Access Control Model", STD 91, RFC 8341, DOI 10.17487/RFC8341, March 2018, <https://www.rfc-editor.org/info/rfc8341>.

Commenté [MB10]: Those are normative.

## 7.2. Informative References

[I-D.ietf-netmod-rfc8407bis]
Bierman, A., Boucadair, M., and Q. Wu, "Guidelines for Authors and Reviewers of Documents Containing YANG Data Models", Work in Progress, Internet-Draft, draft-ietf-netmod-rfc8407bis-28, 5 June 2025, <https://datatracker.ietf.org/doc/html/draft-ietf-netmod-rfc8407bis-28>.

~~[RFC3688] Mealling, M., "The IETF XML Registry", BCP 81, RFC 3688, DOI 10.17487/RFC3688, January 2004, <https://www.rfc-editor.org/info/rfc3688>.~~

[RFC4252] Ylonen, T. and C. Lonvick, Ed., "The Secure Shell (SSH) Authentication Protocol", RFC 4252, DOI 10.17487/RFC4252, January 2006, <https://www.rfc-editor.org/info/rfc4252>.

~~[RFC6020] Bjorklund, M., Ed., "YANG - A Data Modeling Language for the Network Configuration Protocol (NETCONF)", RFC 6020, DOI 10.17487/RFC6020, October 2010, <https://www.rfc-editor.org/info/rfc6020>.~~

[RFC6241] Enns, R., Ed., Bjorklund, M., Ed., Schoenwaelder, J., Ed., and A. Bierman, Ed., "Network Configuration Protocol (NETCONF)", RFC 6241, DOI 10.17487/RFC6241, June 2011, <https://www.rfc-editor.org/info/rfc6241>.

[RFC8040] Bierman, A., Bjorklund, M., and K. Watsen, "RESTCONF Protocol", RFC 8040, DOI 10.17487/RFC8040, January 2017, <https://www.rfc-editor.org/info/rfc8040>.

[RFC8341] Bierman, A. and M. Bjorklund, "Network Configuration Access Control Model", STD 91, RFC 8341, DOI 10.17487/RFC8341, March 2018, <https://www.rfc-editor.org/info/rfc8341>.

[RFC8446] Rescorla, E., "The Transport Layer Security (TLS) Protocol Version 1.3", RFC 8446, DOI 10.17487/RFC8446, August 2018, <https://www.rfc-editor.org/info/rfc8446>.

[RFC9000] Iyengar, J., Ed. and M. Thomson, Ed., "QUIC: A UDP-Based Multiplexed and Secure Transport", RFC 9000, DOI 10.17487/RFC9000, May 2021, <https://www.rfc-editor.org/info/rfc9000>.

[RFC9543] Farrel, A., Ed., Drake, J., Ed., Rokui, R., Homma, S., Makhijani, K., Contreras, L., and J. Tantsura, "A Framework for Network Slices in Networks Built from IETF Technologies", RFC 9543, DOI 10.17487/RFC9543, March 2024, <https://www.rfc-editor.org/info/rfc9543>.

## Appendix A. Abbreviations

AC - Attachment Circuit

PE - Provider Edge

UDP - User Datagram Protocol

**Commenté [MB11]:** I don't think these are useful here.

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