IETF 111 DTN WG
Naming of ADMs

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Agenda

• Asynchronous Data Model (ADM) Structure and example
• Asynchronous Management Model (AMM) Resource Identifier (ARI)
  - Namespaces
  - Nicknames
• Proposal for new RFC to define ARI schema
• Discussion
DTN NM is Documented in 3 Ways

1. Asynchronous Management Architecture (AMA)
   - Aspirational – reasons why we need this for DTN.

2. Asynchronous Management Model (AMM)
   - Series of data objects (rules, tables…)
   - Template for describing objects for an application
     ▪ Application Data Model (ADM) Template
     ▪ JSON encoding
   - Multiple ADMs for applications

3. Asynchronous Management Protocol (AMP)
   - Efficient, binary encoding of ADMs
   - Messaging model and behavior of agents/managers
Standards: DTN NM as it exists in the IETF today

**Architecture**
- Asynchronous Management Architecture (AMA) (Informational)
- Concise Binary Object Representation (CBOR) (Specification)

**Data Model**
- Delay-Tolerant Networking Architecture (RFC4828) (Informational)
- Yet Another Next Generation (YANG) (Specifications)
- App. Data Model Template (ADM Template) (Specification)
- YANG Model (Specification)
- Agent ADM (Specification)
- BP ADM (Specification)
- CGR ADM (Specification)
- LTP ADM (Specification)
- BPSEC ADM (Specification)
- ION ADM (Specification)

**Protocol**
- Asynchronous Management Protocol (AMF) (Specification)
- ION Agent (Implementation)
- ION Mgr (Implementation)
- DTN2 Agent (Implementation)
What is an Application Data Model (ADM)

- Application Data Model (ADM) - The set of statically-defined data items necessary to manage an application asynchronously.

Data models are necessary to the asynchronous management of DTN resources. Each DTN resource will likely utilize many different ADMs.
What is included in the Data Model

From draft-birrane-dtn-adm

- **"Atomic" Elements**
  - **EDDs**: collected by agents.
  - **Literals**: useful constants.
  - **Ops**: opcodes for math functions.
  - **Ctrls**: opcodes for agent behavior.
  - **Tables**: Structured data sets

- **"Dynamic" Elements**
  - **Vars**: strong-typed variables
  - **Macro**: Ordered set ofCtrls.
  - **Rpts**: Ordered sets of data
  - **Rules**: Time or State based autonomy.
ARIs for Unique Identification of ADMs

According to: https://datatracker.ietf.org/doc/draft-birrane-dtn-adm/

- "Every object in the AMM must be uniquely identifiable, regardless of whether the item is defined formally in an ADM document or informally by operators in the context of a specific network deployment. The AMM Resource Identifier (ARI) uniquely identifies AMM objects."

- **AMM Resource Identifier (ARI):** A unique identifier for any AMM object, syntactically conformant to the Uniform Resource Identifier (URI) syntax documented in [RFC3986] and using the scheme name "ari".

**Three components of ARIs:**
- Namespaces
- Object names
- Parameters
Namespaces

According to: https://datatracker.ietf.org/doc/draft-birrane-dtn-adm/

- ADM Namespace: A moderated, hierarchical taxonomy of namespaces that describe a set of ADM scopes. Specifically, an individual ADM namespace is a specific sequence of ADM namespaces, from most general to most specific, that uniquely and unambiguously identify the namespace of a particular ADM.
  - unique namespaces to prevent conflicting names within network deployments
Moderated Namespaces, Object Names, and Parameters

From: https://datatracker.ietf.org/doc/draft-birrane-dtn-adm-agent/

• Each moderated ADM defines a namespace
• The scheme name of the ARI is "ari". The scheme-specific part of the "ari" scheme follows the format:
  • ari:/<Namespace>/ <ObjectName> (Parameters) >

```
"Mdat": [],
"Edd": [],
"Var": [],
"Rptt": [],
"Tblt": [],
"Ctrl": [],
"Const": [],
"Mac": [],
"Oper": []
```

```json
"Mdct": {
  "name": "name",
  "type": "STR",
  "value": "amp_agent",
  "description": "The human-readable name",
},

"name": "namespace",
"type": "STR",
"value": "Amp/Agent",
"description": "The namespace of the ADM",
},

"Edd": {
  "name": "num_rpt_tls",
  "type": "UINT",
  "description": "This is the number of report templates known to the Agent."
},

"Ctrl": {
  "name": "del_var",
  "permspec": {
    "type": "AC",
    "name": "ids"
  },
  "description": "This control removes one or more variable definitions from the Agent."
}
```

ADM Object Types

- ari:/Amp/Agent
- ari:/Amp/Agent/Edd.num_rpt_tls
- ari:/Amp/Agent/Ctrl.del_var(ARI1, ARI2, ..., ARIn)
Nicknames

According to: https://datatracker.ietf.org/doc/draft-birrane-dtn-amp/

- String encoding of ARIs can be quite verbose...

- **Nicknames (NN):** Mechanism defined in Asynchronous Management Protocol (AMP) to reduce the overall size of the encoding of ARIs that are defined in the context of an ADM
  - A NN is calculated as a function of an ADM Moderated Namespace and the type of object being identified

```
"Ctrl": [  
  {  
    "name": "del_var",  
    "parmspec": [{  
      "type": "AC",  
      "name": "ids"  
    }],  
  }  
]
```

```
<table>
<thead>
<tr>
<th>Identifier</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Namespace</td>
<td>Amp/Agent</td>
</tr>
<tr>
<td>ADM Enumeration</td>
<td>1</td>
</tr>
</tbody>
</table>

```

```
<table>
<thead>
<tr>
<th>AMM Object Type</th>
<th>Enumeration</th>
</tr>
</thead>
<tbody>
<tr>
<td>CTRL</td>
<td>1</td>
</tr>
<tr>
<td>VAR</td>
<td>9</td>
</tr>
</tbody>
</table>
```

```
ari:Amp/Agent/Ctrl.del_var(ARI1, ARI2, ..., ARIn)
```
Need for moderated Namespaces and Nicknames

- From https://datatracker.ietf.org/doc/draft-birrane-dtn-adm/
  - IANA Considerations: This document defines a moderated namespace registry in Section 5.1.1.1. 
  This registry is envisioned to be moderated by IANA. Entries in this registry are to be made through Expert Review.
  - Further, the ADM defines a new URI scheme, “ari”, as defined in Section 5.1.5

- From: https://datatracker.ietf.org/doc/draft-birrane-dtn-amp/
  - IANA Considerations: A Nickname registry needs to be established.
Proposal for new RFC for ARI Schema

Namespaces and Nicknames

• Namespace ARIs referenced to ADMs
• Globally unique nicknames for each:
  - Namespace
  - Object Type
Discussion

• Are moderation of namespaces and nicknames possible?

• How to think beyond Moderated ADMs as a source for content?
  - Anonymous and Informal namespaces
  - Services and Information Flows
  - Protocol specific features such as content of a BPv7 PDU that are merely crafting according to the spec (not managed via AMA)

• Will a dynamic registry be required for these?