Bundle Protocol Agent Application Data Model  
draft-birrane-dtn-adm-ion-bpadmin-01

Abstract

This document describes the Application Data Model (ADM) for the  
administration of Bundle Protocol (BP) ION in compliance with the  
template provided by [I-D.birrane-dtn-adm].

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1. Introduction

An Application Data Model (ADM) provides a guaranteed interface for the management of an application or protocol in accordance with the Asynchronous Management Architecture (AMA) defined in [I-D.birrane-dtn-ama]. The ADM described in this document complies with the ADM Template provided in [I-D.birrane-dtn-adm] as encoded using the JSON syntax.

The ION Bundle Protocol Administration ADM contains all of the functionality that is required for the configuration and management of BP on the local ION node.

1.1. Technical Notes

- This document describes Version 0.0 of the ION BP Admin ADM.
- The Asynchronous Resource Identifier (ARI) for this ADM is NOT correctly set. A sample ARI is used in this version of the specification and MAY change in future versions of this ADM until an ARI registry is established. This notice will be removed at that time.
- Agent applications MAY choose to ignore the name, description, or other annotative information associated with the component definitions within this ADM where such items are only used to provide human-readable information or are otherwise not necessary to manage a device.
1.2. Scope

This ADM specifies those components of the Asynchronous Management Model (AMM) common to the configuration and management of Bundle Protocol in ION.

Any Manager software implementing this ADM MUST perform the responsibilities of an AMA Manager as outlined in [I-D.birrane-dtn-adm] as they relate to the objects included in this document.

Any Agent software implementing this ADM MUST perform the responsibilities of an AMA Agent as outlined in [I-D.birrane-dtn-adm] as they relate to the objects included in this document.

1.3. 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. Structure and Design of this ADM

The BP Admin ADM’s structure is in accordance to [I-D.birrane-dtn-adm]. This ADM contains metadata, table templates, and controls. Table Templates are column templates that will be followed by any instance of this table available in the network. They may not be created dynamically within the network by Managers. Controls are predefined and sometimes parameterized opcodes that can be run on an Agent. Controls are preconfigured in Agents and Managers as part of ADM support. There are no variables, report templates, constants, macros, edd, or operators in this ADM at this time. The contents of this ADM are derived from the main functions and data that are needed to configure and manage BP in accordance with (WHICH VERSION OF BP).

All ADMs have metadata that includes the name, namespace, and version of the ADM as well as the name of the organization that is issuing that particular ADM. This is important for identification purposes of the ADMs and to ensure version control. The table templates and controls in this ADM deal with inducts, outducts, schemes, and protocols, the most important things needed for the proper administration of Bundle Protocol.
3. Naming and Identification

This section outlines the namespaces used to uniquely identify ADM objects in this specification.

3.1. Namespace and Nicknames

In accordance with [I-D.birrane-dtn-adm], every ADM is assigned a moderated Namespace. In accordance with [I-D.birrane-dtn-amp], these namespaces may be enumerated for compactness. The namespace and ADM identification for these objects is defined as follows.

<table>
<thead>
<tr>
<th>Identifier</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Namespace</td>
<td>DTN/ION/bpadmin/</td>
</tr>
<tr>
<td>ADM Enumeration</td>
<td>5</td>
</tr>
</tbody>
</table>

Table 1: Namespace Information

Given the above ADM enumeration, in accordance with [I-D.birrane-dtn-amp], the following AMP nicknames are defined.
Table 2: ION BP ADM Nicknames

<table>
<thead>
<tr>
<th>Nickname</th>
<th>Collection</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>DTN/ION/bpadmin/Const</td>
</tr>
<tr>
<td>101</td>
<td>DTN/ION/bpadmin/Ctrl</td>
</tr>
<tr>
<td>102</td>
<td>DTN/ION/bpadmin/Edd</td>
</tr>
<tr>
<td>103</td>
<td>DTN/ION/bpadmin/Mac</td>
</tr>
<tr>
<td>104</td>
<td>DTN/ION/bpadmin/Oper</td>
</tr>
<tr>
<td>105</td>
<td>DTN/ION/bpadmin/Rptt</td>
</tr>
<tr>
<td>107</td>
<td>DTN/ION/bpadmin/Tblt</td>
</tr>
<tr>
<td>109</td>
<td>DTN/ION/bpadmin/Var</td>
</tr>
<tr>
<td>110</td>
<td>DTN/ION/bpadmin/Mdat</td>
</tr>
<tr>
<td>111-119</td>
<td>DTN/ION/bpadmin/Reserved</td>
</tr>
</tbody>
</table>

4. ION BP Admin ADM JSON Encoding

The following is the JSON encoding of the Bundle Protocol Admin Application Data Model:

```json
{
  "Mdat": [
    {
      "name": "name",
      "type": "STR",
      "value": "ion_bp_admin",
      "description": "The human-readable name of the ADM."
    },
    {
      "name": "namespace",
      "type": "STR",
      "value": "DTN/ION/bpadmin",
      "description": "The namespace of the ADM"
    },
    {
      "name": "version",
      "type": "STR",
      "value": "v0.0",
```
"description": "The version of the ADM"
},
{
  "name": "organization",
  "type": "STR",
  "value": "JHUAPL",
  "description": "The name of the issuing organization of the ADM"
}
],
"Edd": [{
  "name": "bp_version",
  "type": "STR",
  "description": "Version of installed ION BP Admin utility."
}]
],
"Tblt": [{
  "name": "endpoints",
  "columns": [{
    "type": "STR",
    "name": "scheme_name"
  },
  {
    "type": "STR",
    "name": "endpoint_nss"
  },
  {
    "type": "UINT",
    "name": "app_pid"
  },
  {
    "type": "STR",
    "name": "recv_rule"
  },
  {
    "type": "STR",
    "name": "rcv_script"
  }],
  "description": "Local endpoints, regardless of scheme name."
},
{
  "name": "inducts",
  "columns": [{
    "type": "STR",
    "name": "protocol_name"
  },
  {
    "type": "STR",
    "name": "duct_name"
  },
  {
    "type": "STR",
    "name": "cli_control"
  }],
  "description": "Inducts established locally for the indicated CL protocol."}
```json
{
  "name": "outducts",
  "columns": [{
    "type": "STR",
    "name": "protocol_name"
  }, {
    "type": "STR",
    "name": "duct_name"
  }, {
    "type": "UINT",
    "name": "clo_pid"
  }, {
    "type": "STR",
    "name": "clo_control"
  }, {
    "type": "UINT",
    "name": "max_payload_length"
  }],
  "description": "If protocolName is specified, this table lists all outducts established locally for the indicated CL protocol. Otherwise, it lists all locally established outducts, regardless of their protocol."
},
{
  "name": "protocols",
  "columns": [{
    "type": "STR",
    "name": "name"
  }, {
    "type": "UINT",
    "name": "payload_bpf"
  }, {
    "type": "UINT",
    "name": "overhead_bpf"
  }, {
    "type": "UINT",
    "name": "protocol class"
  }],
  "description": "Convergence layer protocols that can currently be utilized at the local node."
},
{
  "name": "schemes",
  "columns": [{
    "type": "STR",
    "name": "scheme_name"
  }],
  "description": "If protocolName is specified, this table lists all schemes that can be utilized for the indicated outduct. Otherwise, it lists all schemes that can be utilized at the local node."
}
```

}, {  
  "type": "UINT",
  "name": "fwd_pid"
}, {  
  "type": "STR",
  "name": "fwd_cmd"
}, {  
  "type": "UINT",
  "name": "admin_app_pid"
}, {  
  "type": "STR",
  "name": "admin_app_cmd"
}],
  "description": "Declared endpoint naming schemes."
},
{
  "name": "egress_plans",
  "columns": [
    {  
      "type": "STR",
      "name": "neighbor_eid"
    },
    {  
      "type": "UINT",
      "name": "clm_pid"
    },
    {  
      "type": "UINT",
      "name": "nominal_rate"
    }
  ],
  "description": "Egress plans."
}
},
"Ctrl": [
  {  
    "name": "endpoint_add",
    "parmspec": [
      {  
        "type": "STR",
        "name": "endpoint_id"
      },
      {  
        "type": "UINT",
        "name": "type"
      },
      {  
        "type": "STR",
        "name": "rcv_script"
      }
    ],
    "description": "Establish DTN endpoint named endpointId on the local node. The remaining parameters indicate what is to be done when bundles destined for this endpoint arrive at a time when no application has the endpoint open for bundle reception. If type is 'x', then such bundles
are to be discarded silently and immediately. If type is ‘q’, then such bundles are to be enqueued for later delivery and, if recvScript is provided, recvScript is to be executed.

    }
];

    "name": "endpoint_change",
    "parmspec": [{
      "type": "STR",
      "name": "endpoint_id"
    }, {
      "type": "UINT",
      "name": "type"
    }, {
      "type": "STR",
      "name": "rcv_script"
  }],
  "description": "Change the action taken when bundles destined for this endpoint arrive at a time when no application has the endpoint open for bundle reception."
  },
  {
    "name": "endpoint_del",
    "parmspec": [{
      "type": "STR",
      "name": "endpoint_id"
    }],
    "description": "Delete the endpoint identified by endpointId. The control will fail if any bundles are currently pending delivery to this endpoint."
  },
  {
    "name": "induct_add",
    "parmspec": [{
      "type": "STR",
      "name": "protocol_name"
    }, {
      "type": "STR",
      "name": "duct_name"
    }, {
      "type": "STR",
      "name": "cli_control"
  }],
  "description": "Establish a duct for reception of bundles via the indicated CL protocol. The duct’s data acquisition structure is used and populated by the induct task whose operation is initiated by"
"description": "Change the control used to initiate operation of the induct task for the indicated duct."
},

{ "name": "induct_del",
 "parmspec": [{
 "type": "STR",
 "name": "protocol_name"
 }, {
 "type": "STR",
 "name": "duct_name"
 }],
 "description": "Delete the induct identified by protocolName and ductName. The control will fail if any bundles are currently pending acquisition via this induct."
},

{ "name": "induct_start",
 "parmspec": [{
 "type": "STR",
 "name": "protocol_name"
 }, {
 "type": "STR",
 "name": "duct_name"
 }],
 "description": "Start the indicated induct task as defined for the indicated CL protocol on the local node."
},

{ "name": "induct_stop",
 "parmspec": [{
 "type": "STR",
 "name": "protocol_name"
 }],
 "description": "Stop the induct task for the indicated duct."
}

"cliControl at the time the duct is started."


}, {
  "type": "STR",
  "name": "duct_name"
}]
},
"description": "Stop the indicated induct task as defined for
the indicated CL protocol on the local node."
},
{
  "name": "manage_heap_max",
  "parmspec": [{
    "type": "UINT",
    "name": "max_database_heap_per_acquisition"
  }],
  "description": "Declare the maximum number of bytes of SDR heap
space that will be occupied by any single bundle
acquisition activity (nominally the acquisition
of a single bundle, but this is at the
discretion of the convergence-layer input task).
All data acquired in excess of this limit will
be written to a temporary file pending extraction
and dispatching of the acquired bundle or
bundles. The default is the minimum allowed
value (560 bytes), which is the approximate size
of a ZCO file reference object; this is the
minimum SDR heap space occupancy in the event
that all acquisition is into a file."
},
{
  "name": "outduct_add",
  "parmspec": [{
    "type": "STR",
    "name": "protocol_name"
  },
  {"type": "STR",
   "name": "duct_name"
  },
  {"type": "STR",
   "name": "clo_command"
  },
  {"type": "UINT",
   "name": "max_payload_length"
  }],
  "description": "Establish a duct for transmission of bundles via
the indicated CL protocol. The duct’s data
transmission structure is serviced by the outduct
task whose operation is initiated by
CLOcommand at the time the duct is started. A
value of zero for maxPayloadLength indicates
that bundles of any size can be accommodated; this is the default.

},
{
  "name": "outduct_change",
  "parmspec": [
    {
      "type": "STR",
      "name": "protocol_name"
    },
    {
      "type": "STR",
      "name": "duct_name"
    },
    {
      "type": "STR",
      "name": "clo_control"
    },
    {
      "type": "UINT",
      "name": "max_payload_length"
  }],
  "description": "Set new values for the indicated duct’s payload size limit and the control that is used to initiate operation of the outduct task for this duct."
},
{
  "name": "outduct_del",
  "parmspec": [
    {
      "type": "STR",
      "name": "protocol_name"
    },
    {
      "type": "STR",
      "name": "duct_name"
  }],
  "description": "Delete the outduct identified by protocolName and ductName. The control will fail if any bundles are currently pending transmission via this outduct."
},
{
  "name": "outduct_start",
  "parmspec": [
    {
      "type": "STR",
      "name": "protocol_name"
    },
    {
      "type": "STR",
      "name": "duct_name"
  }],
  "description": "Start the indicated outduct task as defined for the indicated CL protocol on the local node."


```
{"name": "egress_plan_block",
"parmspec": [{
  "type": "STR",
  "name": "plan_name"
}]
},
"description": "Disable transmission of bundles queued for transmission to the indicated node and reforwards all non-critical bundles currently queued for transmission to this node. This may result in some or all of these bundles being enqueued for transmission to the pseudo-node limbo."
},
{"name": "egress_plan_unblock",
"parmspec": [{
  "type": "STR",
  "name": "plan_name"
}]
},
"description": "Re-enable transmission of bundles to the indicated node and reforwards all bundles in limbo in the hope that the unblocking of this egress plan will enable some of them to be transmitted."
},
{"name": "outduct_stop",
"parmspec": [{
  "type": "STR",
  "name": "protocol_name"
}, {
  "type": "STR",
  "name": "duct_name"
}]
},
"description": "Stop the indicated outduct task as defined for the indicated CL protocol on the local node."
},
{"name": "protocol_add",
"parmspec": [{
  "type": "STR",
  "name": "protocol_name"
}, {
  "type": "UINT",
  "name": "payload_bytes_per_frame"
}]
}
"type": "UINT",
"name": "overhead_bytes_per_frame"
},

"type": "UINT",
"name": "nominal_data_rate"
},
"description": "Establish access to the named convergence layer protocol at the local node. The payloadBytesPerFrame and overheadBytesPerFrame arguments are used in calculating the estimated transmission capacity consumption of each bundle, to aid in route computation and congesting forecasting. The optional nominalDataRate argument overrides the hard coded default continuous data rate for the indicated protocol for purposes of rate control. For all promiscuous protocols—that is, protocols whose outducts are not specifically dedicated to transmission to a single identified convergence-layer protocol endpoint— the protocol’s applicable nominal continuous data rate is the data rate that is always used for rate control over links served by that protocol; data rates are not extracted from contact graph information. This is because only the induct and outduct throttles for non-promiscuous protocols (LTP, TCP) can be dynamically adjusted in response to changes in data rate between the local node and its neighbors, as enacted per the contact plan. Even for an outduct of a non-promiscuous protocol the nominal data rate may be the authority for rate control, in the event that the contact plan lacks identified contacts with the node to which the outduct is mapped."
},

{  "name": "protocol_del",
  "parmspec": [{
    "type": "STR",
    "name": "protocol_name"
  }],
  "description": "Delete the convergence layer protocol identified by protocolName. The control will fail if any ducts are still locally declared for this protocol."
}
"name": "protocol_start",
"parmspec": [{
  "type": "STR",
  "name": "protocol_name"
}]
},
"description": "Start all induct and outduct tasks for inducts and outducts that have been defined for the indicated CL protocol on the local node."
},
{
  "name": "protocol_stop",
  "parmspec": [{
    "type": "STR",
    "name": "protocol_name"
  }],
  "description": "Stop all induct and outduct tasks for inducts and outducts that have been defined for the indicated CL protocol on the local node."
},
{
  "name": "scheme_add",
  "parmspec": [{
    "type": "STR",
    "name": "scheme_name"
  }, {
    "type": "STR",
    "name": "forwarder_control"
  }, {
    "type": "STR",
    "name": "admin_app_control"
  }],
  "description": "Declares an endpoint naming scheme for use in endpoint IDs, which are structured as URIs: schemeName:schemeSpecificPart. forwarderControl will be executed when the scheme is started on this node, to initiate operation of a forwarding daemon for this scheme. adminAppControl will also be executed when the scheme is started on this node, to initiate operation of a daemon that opens a custodian endpoint identified within this scheme so that it can receive and process custody signals and bundle status reports."
},
{
  "name": "scheme_change",
  "parmspec": [{
    "type": "STR",
    "name": "scheme_name"
  }]
}


```json
}, {
    "type": "STR",
    "name": "forwarder_control"
}, {
    "type": "STR",
    "name": "admin_app_control"
}],
"description": "Set the indicated scheme’s forwarderControl and adminAppControl to the strings provided as arguments."
},
{
    "name": "scheme_del",
    "parmspec": [{
        "type": "STR",
        "name": "scheme_name"
    }],
    "description": "Delete the scheme identified by schemeName. The control will fail if any bundles identified in this scheme are pending forwarding, transmission, or delivery."
},
{
    "name": "scheme_start",
    "parmspec": [{
        "type": "STR",
        "name": "scheme_name"
    }],
    "description": "Start the forwarder and administrative endpoint tasks for the indicated scheme task on the local node."
},
{
    "name": "scheme_stop",
    "parmspec": [{
        "type": "STR",
        "name": "scheme_name"
    }],
    "description": "Stop the forwarder and administrative endpoint tasks for the indicated scheme task on the local node."
},
{
    "name": "watch",
    "parmspec": [{
        "type": "UINT",
        "name": "status"
    }],
```
"type": "STR",
"name": "activity_spec"
}],
"description": "Enable/Disable production of a continuous stream of user selected Bundle Protocol activity indication characters. A watch parameter of 1 selects all BP activity indication characters, 0 deselects all BP activity indication characters; any other activitySpec such as acz~ selects all activity indication characters in the string, deselecting all others. BP will print each selected activity indication character to stdout every time a processing event of the associated type occurs: a new bundle is queued for forwarding, b bundle is queued for transmission, c bundle is popped from its transmission queue, m custody acceptance signal is received, w custody of bundle is accepted, x custody of bundle is refused, y bundle is accepted upon arrival, z bundle is queued for delivery to an application, ~ bundle is abandoned (discarded) on attempt to forward it, ! bundle is destroyed due to TTL expiration, & custody refusal signal is received, # bundle is queued for re-forwarding due to CL protocol failures, j bundle is placed in ‘limbo’ for possible future reforwarding, k bundle is removed from ‘limbo’ and queued for reforwarding, $ bundle’s custodial retransmission timeout interval expired."
}
]
}

5. IANA Considerations

At this time, this protocol has no fields registered by IANA.

6. References

6.1. Informative References

[I-D.birrane-dtn-ama]
Birrane, E., "Asynchronous Management Architecture",
draft-birrane-dtn-ama-07 (work in progress), June 2018.
6.2. Normative References

[I-D.birrane-dtn-adm]

[I-D.birrane-dtn-amp]


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