

Asynchronous Management Architecture (AMA)

...Next Steps to Standardization

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DTN Management Architecture (DTNMA)

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Asynchronous Management Architecture (AMA) renamed to DTN Management Architecture (DTNMA)

- <https://datatracker.ietf.org/doc/draft-ietf-dtn-dtnma/>
- But...motivation, design principles, and architecture remain the same
- A network management solution designed strictly for management of “Challenged Networks” as defined in RFC7228 (<https://datatracker.ietf.org/doc/rfc7228/>)

Challenged Network Management

Services Needed

- Configuration
- Reporting
- Autonomous parameterized procedure calls
- Authorized Administration, Accounting, and Error Control

Desirable Properties

- Asynchronous, Dynamic, and Highly Logical Architecture
- Model-derived and Hierarchically Organized Definition of Information
- Intelligent push of information
- Minimized message size Not Node Processing
- Absolute data identification
- Custom data definition
- Autonomous operation

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Updates and Additions: Services Needed

- Authorized Administration, Accounting, and Error Control:
 - Requirement to provide authorization and restriction of controls and reporting between agents and managers
 - Automated error handling to:
 - Protect faulty execution and interpretation of network management commands and messages
 - Avoid circular references or nesting in complex statements
 - Ensure consistency with data model and apply any defined constraints on objects

Updates and Additions: Desirable Properties

- Asynchronous, Dynamic, and Highly Logical Architecture
 - Agnostic of physical topology, transport protocols, security solutions, and supporting infrastructure
 - No prescribed association between manager and agent
 - No limitation to the number of managers that can control an agent

Updates and Additions: Desirable Properties

- Model-derived and Hierarchically Organized Definition of Information
 - Architecture based on a shared model serving as a contract between agent and manager
 - Concise representation of information through hierarchical organization
 - Enables automated error handling

Agent and Manager Roles and Responsibilities

Agent Responsibilities

- Manager Mapping
- Application Support
- Local Data Collection
- Autonomous Control
- Autonomous Reporting
- Custom Data Definition
- Consolidate Messages
- Error Checking and State Control
- Authorized Administration and Accounting

Manager Responsibilities

- Agent Capabilities Mapping
- Agent Messaging
- Data Collection
- Custom Data Definition
- Data Fusion
- Error Checking and State Control
- Authorized Administration and Accounting

Challenged, DTN Management

- Just because a synchronous links cannot be formed, does NOT mean the messages are lost
- *A collection of reports from Agent B delivered to manager at step (4) when link returns*

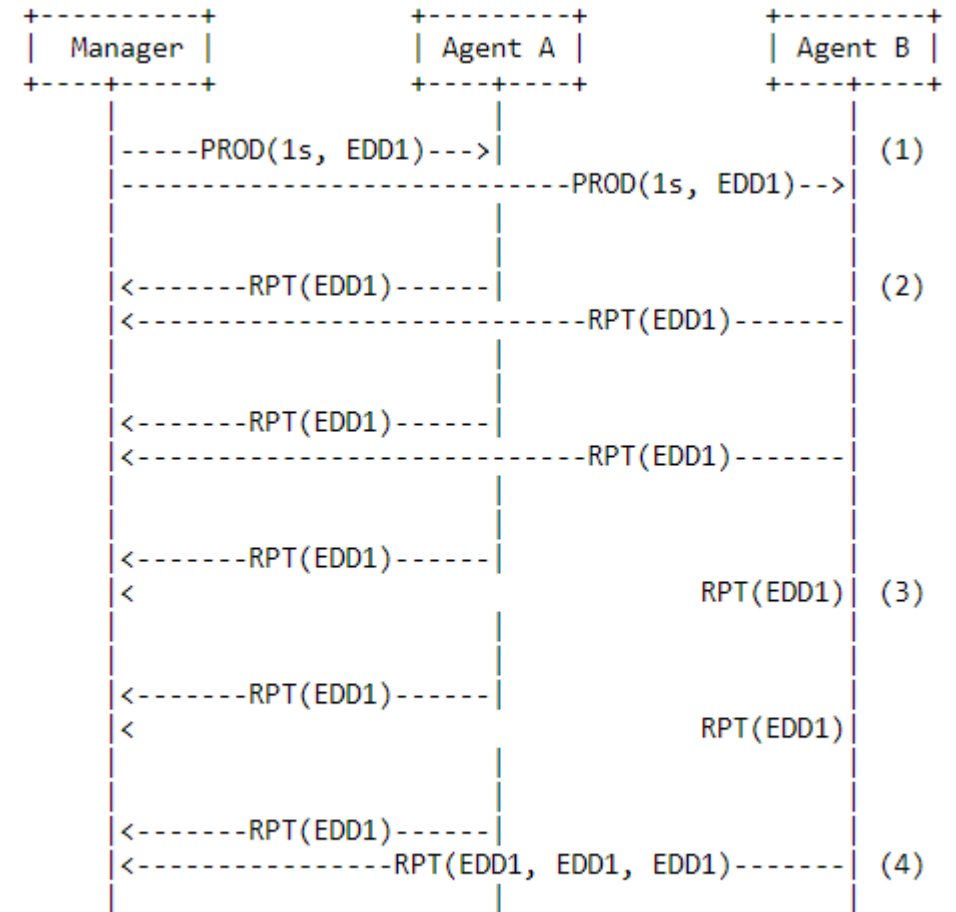


Figure 3

Consolidated Messages Management

- Agents should attempt where possible to combine messages to limit network utilization
- *Report for EDD1 and EDD2 combined and delivered together in step (4)*

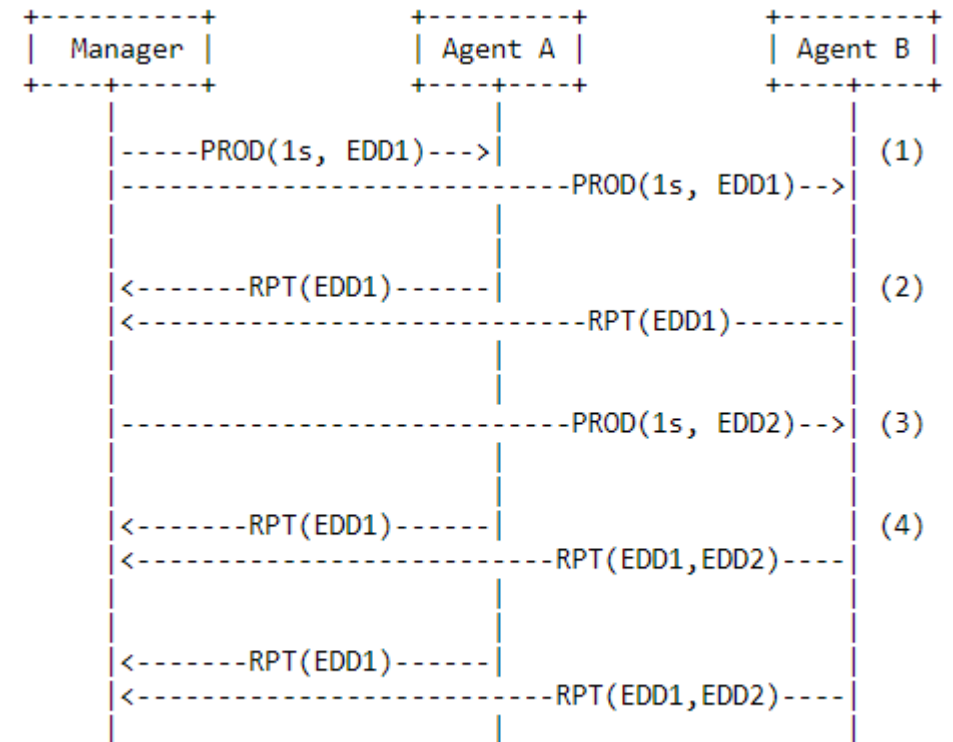


Figure 4

Multiplexed Management

- Clarifying combined manager and agent roles on single actor
- Agents receive controls
- Managers receive reports

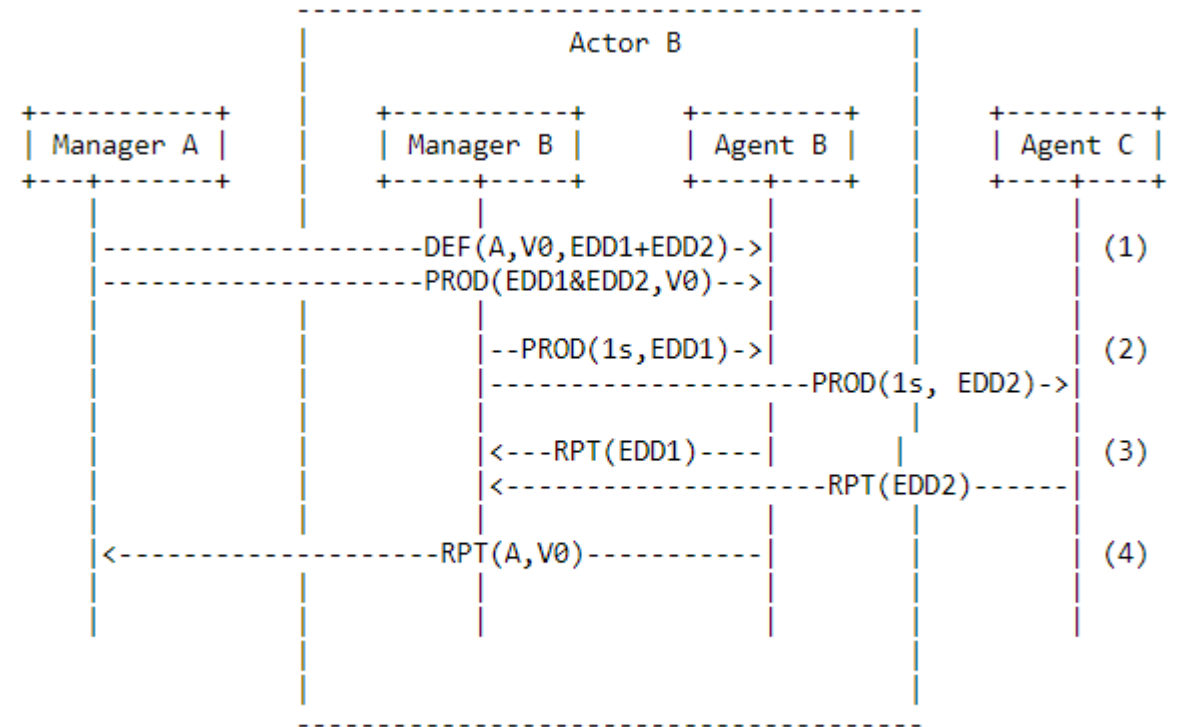


Figure 6

Questions to WG

- What is needed to finish this informative DTN Network Management Architecture
- Does it need any accompanying documents (ADM, ARI, etc.)

AMM Resource Identifier (ARI)

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Asynchronous Management Model (AMM) Resource Identifier (ARI)

- The Asynchronous Management Model (AMM)
 - Data types and structures needed to manage applications in DTNMA
 - Defined in the DTNMA Application Data Model (<https://datatracker.ietf.org/doc/draft-birrane-dtn-adm/>)
- AMM Resource Identifier (ARI), v00: <https://datatracker.ietf.org/doc/draft-birrane-dtn-ari/>
 - Defines structure, format, and features of naming scheme of AMM objects
 - Defines new URI scheme “ari”
- Version 00 posted now, new rev coming soon...

Scheme Utility

- Need for an efficient syntax for encoding and decoding the external DTNMA schema (AMMs, ADMs)
- Support for the following
 - Parameterization
 - Compressibility
 - Patterning

Moderation and hierarchy to come later, the ARI doc only defines the URI syntax

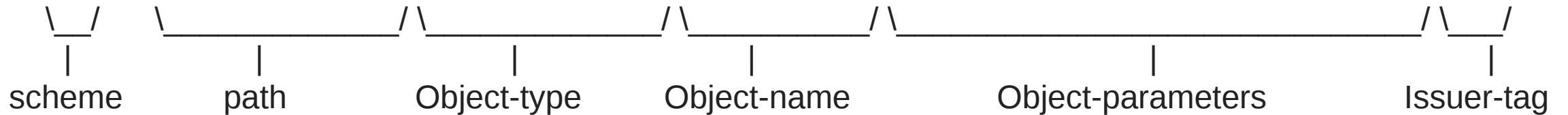
ARI Components

- Namespace □ Issuer/path
- Objects
- Parameters
- Tags

Namespace types:

- Moderated/Informal: ari:/namespace/path/
- Anonymous: ari:path/

URI = scheme:/namespace/path/ammObjectType.objectName(([object_param1],[object_param2], [])#tag



Existing Examples of ARIs

Note:

The structure and syntax defined today is being reworked to better align with implementation and benefit from CBOR encoding diagnostic notation

ARI String	Description
"ari:/N1/N2/num_bytes"	Unparameterized num_bytes object in the N1/N2 informal namespace.
"num_bytes"	Shortform encoding where the N1/N2 namespace can be assumed.
"num_bytes_if(String if_name)"	Formal parameter definition of num_bytes object that accepts a string interface name.
"num_bytes_if(String if_name=eth0)"	Formal parameter definition of num_bytes object that accepts a string interface name with a default value.
"num_bytes_if()"	Actual parameter using the default value of eth0.
"num_bytes_if(eth0)"	Actual parameter of eth0.
"ari:/obj1(Int n1 = 0, Int n2 = 3)"	Formal parameter of object obj1 in anonymous namespace taking 2 default parameters.
"ari:/obj1(,)"	Actual parameter using the default values of 0 for n1 and 3 for n2.
"ari:/obj1(, 4)"	Actual parameter using the default value of 0 for n1.
"ari:/obj1(4,)"	Actual parameter using the default value of 3 for n2.
"ari:/obj1(4,4)"	Actual parameters provided for all obj1 parameters.
"ari:/obj1(<input>,4)"	Actual parameters provided for all obj1 parameters, with the value of the first parameter taken from some other parameter named "input".
"ari:uint(4)"	The Literal value 4 interpreted as a 32-bit unsigned integer.

Questions

- Does the ARI deserve its own document?
- Is the IETF DTN WG ready to adopt this within its new charter?
- What features and requirements are desired for ARIs?

Thank you

