SNMP Agent Extensibility (agentx)

Working Group of the 34th IETF

December 6 and 8, 1995

Session 1:
Wednesday, December 6, 1995, 1300-1500

- Introduction and Review of the Charter

  The chair will present the working group's charter and provide a history of IETF discussion and publication in this area.

- Presentations by Interested Parties

  All participants are invited to make prepared, or impromptu, presentations to the working group.

  (singing afterwards, optional)

- Group Discussion of Presentations

  Questions of a clarifying nature may be asked during each individual presentation; however, all other questions should be held until all presentations are heard. At that time, questions and discussions on all presentations and topics will be held.

Session 2:
Friday, December 8, 1995, 0900-1130

- Group Discussion of Presentations (continued)
- Review of Problems and Approaches

  In real-time, the group will attempt to derive a taxonomy of the problems, approaches, and experiences presented and discussed.

- Group Discussion on How to Proceed in a timely fashion

Introduction

- To subscribe: `mailto:agentx-request@fv.com`
- Archives: `ftp://ftp.fv.com/pub/mrose/agentx`
- Goal: see if we can agree on SNMP multiplexing

Review of the Charter

The goal of this working group is to define standards-track technology for SNMP Agent extensibility. The resulting technology specification will allow independently developed sub-agents to communicate with a master-agent running on an Internet device.

The technology specification will consist of:

- (mandatory) a platform-independent protocol which supports intra-agent communication within a device or local area network;
- (optional) a MIB module, which, when implemented by a master-agent, allows an SNMP-based management application to monitor and control the intra-agent communication service; and,
- (optional) a programmatic interface to the services offered by that protocol.

Review of the Charter (cont.)

The working group is explicitly directed to develop a solution which is adequate to achieve transparency with respect to whether a SNMP request is processed by a master-agent and/or one or more sub-agents; simultaneously, the working group is further directed to use good engineering judgement is developing an approach with the smallest reasonable "footprint" to achieve intra-agent communication. As a consequence, the working group may choose to avoid complete transparency, if, at its discretion, this proves too costly. In this case, the working group should document its decision for this engineering trade-off.

Although the working group will solicit existing specifications and experience in this area, it will produce a vendor-neutral technology specification.

Review of the Charter (cont.)

- Goals and Milestones:

  12/95: First meeting

  12/95: First pass at I-Ds

  01/96: Second pass at I-Ds

  03/96: Second meeting

  04/96: Final pass at I-Ds

  05/96: Submit I-Ds to IESG

The Multiple Component Problem

- The traditional agent has several functions, including:

  receive requests;

  apply administrative policies;

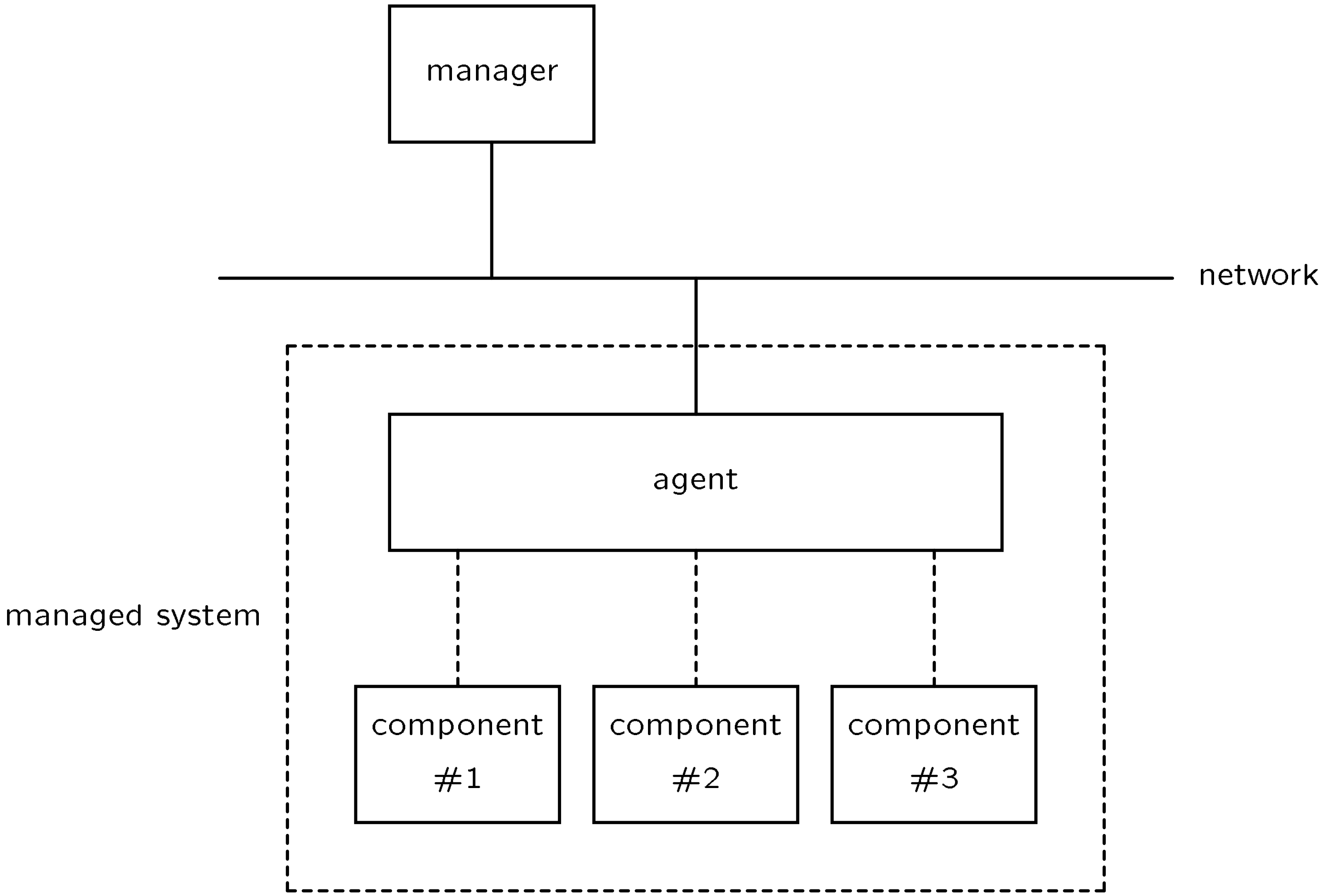
  access instrumentation;

  generate responses; and,

  generate notifications

- Sometimes the object resources are implemented in multiple components

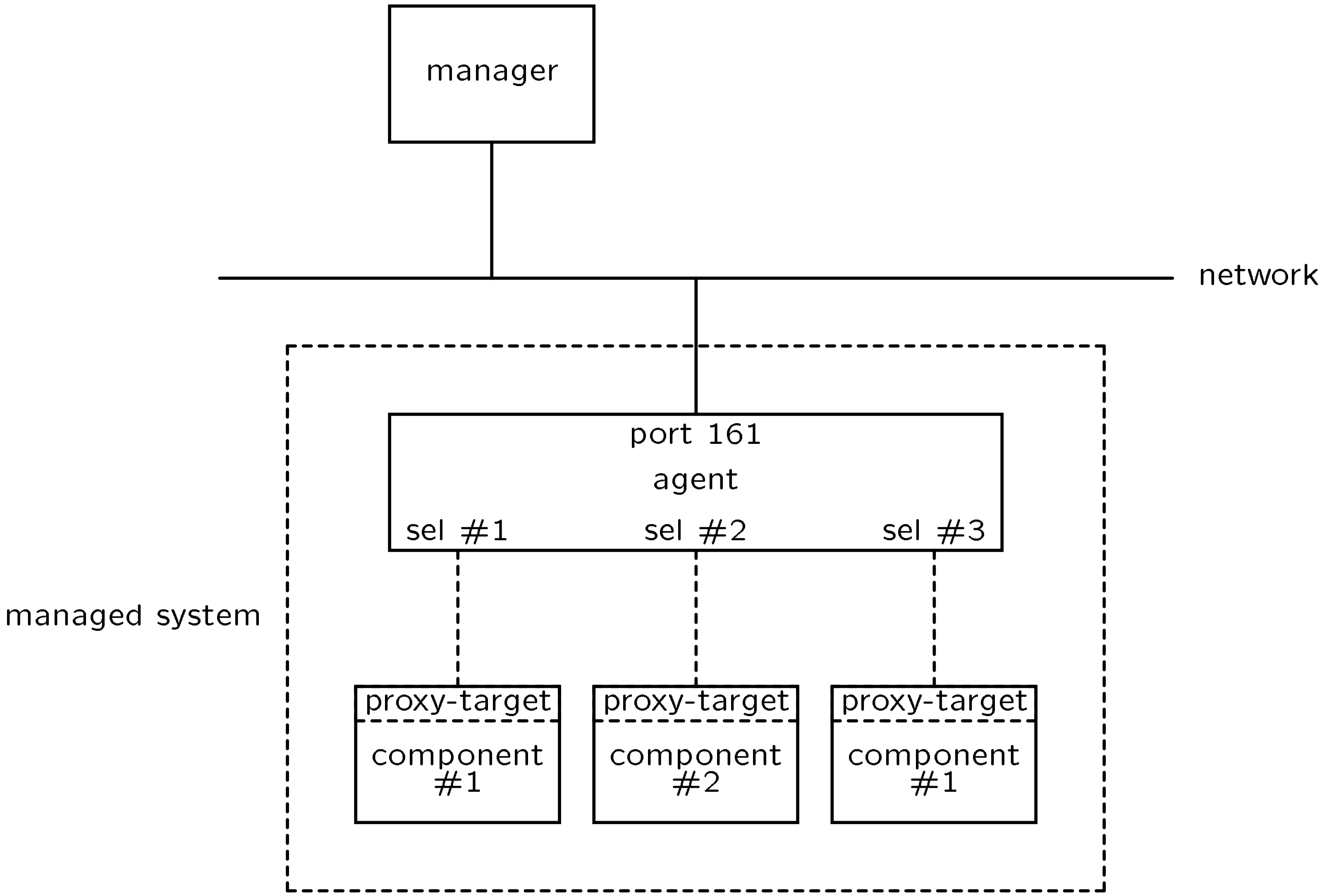
- There are two deployment strategies for such environments


manager
network
agent
managed system
component
#1
component
#2
component
#3

The Packet-Multiplexing Approach

- Require that each component have its own agent,
  termed the proxy-target
- Decide whether the manager should talk:
  directly to the proxy-target; or,
  indirectly to the proxy-target, via a proxy-agent
- Choice depends on addressing capabilities of manager,
  directly: use different port, selector irrelevant
  indirectly: use port 161, but use a different selector
- With the "direct" choice,
  each component is its own managed system; and,
  there is no relationship between components

  so, there is no multiple component problem
- Hence, only the "indirect" choice is interesting


manager
network
port 161
agent
sel #1
sel #2
sel #3
managed system
proxy-target
component #1
proxy-target
component #2
proxy-target
component #1

10

Strategy for Proxy-Multiplexing

- The proxy-agent and each proxy-target contains their own separate
  `system` and `snmp` objects

- The proxy-agent contains:
  information on managers and proxy-targets; and,
  (usually) minimal object resources

- Each proxy-target contains:
  information on its own proxy-agent; and,
  extensive object resources in a single MIB view

Agreements for Proxy-Multiplexing

- Platform-Independent Configuration:

  identity of a proxy-target;

  textual description of a proxy-target

  mapping a selector to a proxy-target; and,

  how the proxy-agent communicates with a proxy-target

- The proxy-agent may have local objects to support discovery

- How configuration information is shared between

  the proxy-agent and its proxy-targets

  is in the realm of platform-dependent agreements

Example Agreements

- An example Platform-Independent Agreement:

  SNMPv2 contexts identify proxy-targets;

  SNMPv1 used to communicate with proxy-targets; and,

  community strings are unpredictable

- An example Platform-Dependent Agreement (for UNIX):

  use `/etc/inet/proxy.conf` to read configuration; and,

  exchange SNMPv1 messages via shared-memory

  (maybe) C API for proxy-target developers

The Variable-Multiplexing Approach

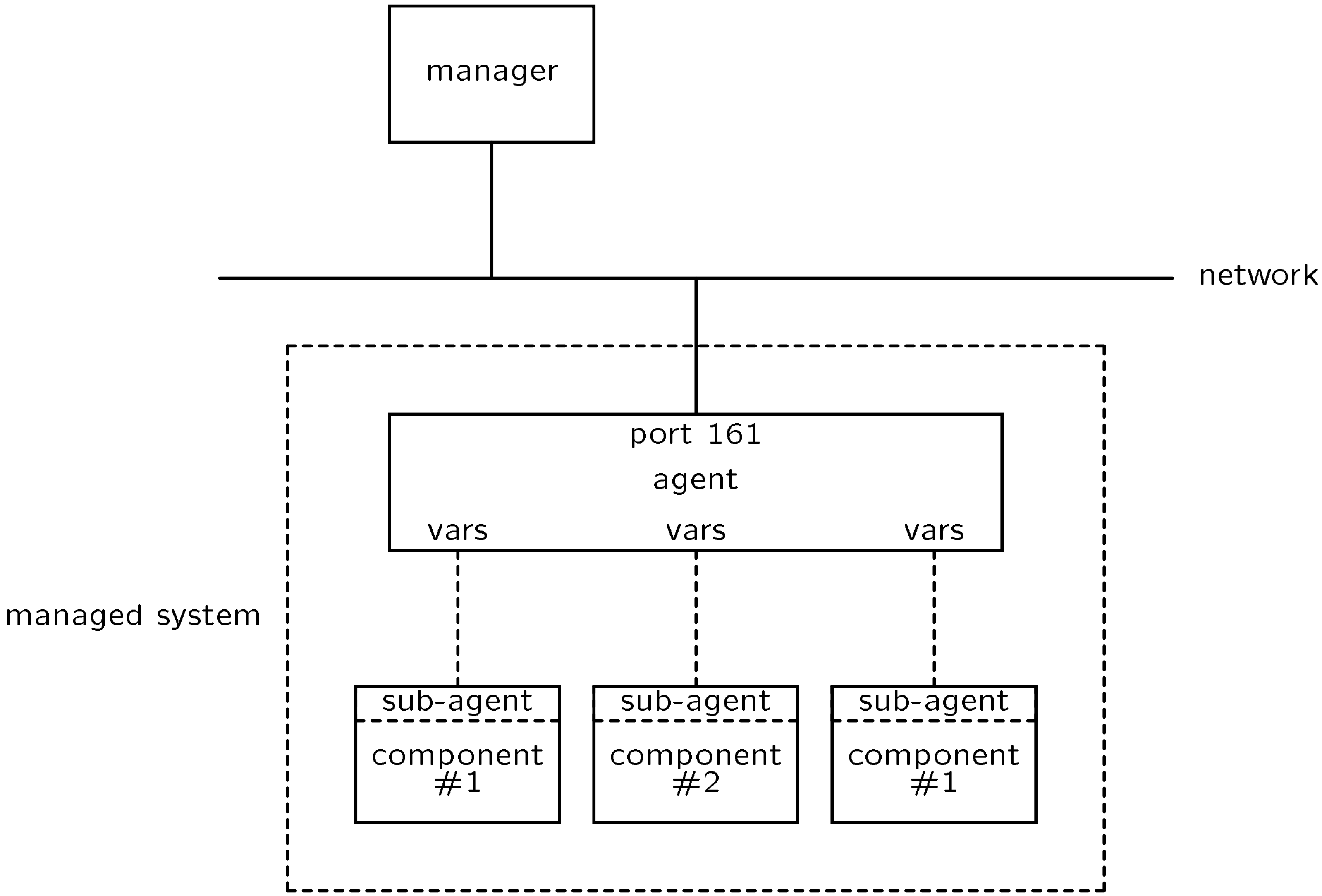
- The master agent must have some knowledge about object resources

  in a sub-agent, at some level of granularity

- Manager talks to the master-agent,

  which accesses instrumentation in various components

- A single SNMP operation might involve multiple components


manager
network
port 161
agent
vars
vars
vars
managed system
sub-agent
component
#1
sub-agent
component
#2
sub-agent
component
#1

Strategy for Variable-Multiplexing

- The master-agent and all components share the `system` objects,
  but the master-agent contains the `snmp` objects

- The master-agent contains:
  information on managers and components; and,
  (usually) minimal object resources

- Each component contains:
  information on its own master-agent; and,
  object resources in a (partial) MIB view

Agreements for Variable-Multiplexing

- Platform-Independent Configuration:

  how components register their object resources;

  how the master-agent communicates which a component; and,

  how component instrumentation interacts

- The master-agent has local objects to support discovery

  e.g., `sysORTable` or the Entity MIB, etc.

  (the granularity and distribution of this knowledge is an issue)

- Configuration is essentially dynamic

Example Agreements

- An example Platform-Independent Agreement

  special-purpose protocol for intra-agent communications

- An example Platform-Dependent Agreement (for UNIX):

  exchange PDUs messages via shared-memory; and,

  (maybe) C API for component developers

Observations

- Considerable similarity between the two approaches,

  e.g., one could design an single API for both approaches,

  and, at start-up, the API library decides which to use

- Issues seem to focus on component transparency to manager

- If so, master-agent must emulate MIB view semantics, e.g.,

  counters and `sysUpTime`,

  "as if simultaneous" sets, and so on

- If not, manager must relate

  multiple views of the same managed system

IETF Publications

- SMUX - RFC 1227: May, 1991 (historic)
- DPI - RFC 1228: May, 1991 (obsoleted)
- DPI - RFC 1592: March, 1994 (informational)
- `draft-dckmtr-proxy-00.txt`: January, 1995 (deleted)
- other I-Ds: I couldn't find any, but there's no index...

Presentations By Interested Parties

All participants are invited to make prepared, or impromptu, presentations to the working group, answering these three questions:

- *what are the issues which are driving agent extensibility?*
- *what technologies exist which address these issues?*
- *what are the real-world experiences with these technologies?*

By convention, participants with prepared presentations will present first.

Questions of a clarifying nature may be asked during each individual presentation; however, all other questions should be held until all presentations are heard. At that time, questions and discussions on all presentations and topics will be held.

Group Discussion of Presentations

Review of Problems and Approaches

In real-time, the group will attempt to derive a taxonomy of the problems, approaches, and experiences presented and discussed.

Group Discussion on
How to Proceed in a Timely Fashion