MADP
Multicast Address Discovery Protocol
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Agenda

• Problem Statement
• MADP Goals
• MADP Basics
• MADP Details
• MADP Example
Problem Statement

• Enterprise Networks wish to deploy Scoped Zones
  – Allows them to limit the scope of applications
    • Examples: Norton Ghost, Altiris
  – Many applications use “fixed” addresses
    • Often due to need for (near) zero-configuration operation
    • Some haven’t even bothered to register with IANA!!
      – Address Assignment by “Atmospheric Extraction”
  – Scope range maintenance becomes complex
    • Must make exceptions for these “rogue” applications
    • More and more such applications popping up
  – Need a way to achieve (near) zero-configuration and yet give network admin control of addresses used by apps
MADP Goal

- Provide simple alternative to “hardcoding”
  - Flexible and yet super simple technique
  - Provide Publicly available code library
    - Make things as simple as an API call
  - Provide more flexible scoped application deployment in multicast networks
  - Take away all “excuses” to hardcode addresses
MADP Basics

• Multicast Address Discovery Protocol
  – Very light-weight
  – Assumes no support infrastructure other than:
    • IP Multicast
    • RFC 2365 Administratively Scoped Zones
      – Well-Known Scopes (Local & Org. Local Scopes)
      – Scope Relative Addresses
  – No dependence on 3rd party infrastructure
    • Runs entirely in Application Clients and Servers
MADP Basics

• Servers listen on Scope Relative Addresses
  – When a Request is received, they check to see if they are the Server for application “X”
  – If so, they send a Response containing multicast address information
    • Address information was preconfigured by network admin
MADP Basics

• Clients performs Expanding Ring Search
  – Link-Local -> Local Scope -> Org-Local Scope

• Send Requests on Scope Relative address
  • IPv4 Link-Local is special case using:
    – MADP Local Scope Relative Address and
    – TTL=1
  – Request info on what multicast address(es) application “X” is using
RFC 2365 – Administratively Scoped Zones

- Defines only 2 Well-Known Scopes
  - Organization-Local Scope (239.192/14)
    - Largest scope within the Enterprise network (i.e. entire Enterprise Network)
  - Local Scope (239.255/16)
    - Smallest possible scope within the Enterprise network
      - Other scopes may be equal to but not smaller in scope
### IPv4 Scope Relative Addresses – RFC 2365

Top 256 Addresses of every Admin. Scope Range

<table>
<thead>
<tr>
<th>Last Octet</th>
<th>Offset</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>.255</td>
<td>-0</td>
<td>SAP Session Announcement Protocol (SDR)</td>
</tr>
<tr>
<td>.254</td>
<td>-1</td>
<td>MADCAP Protocol</td>
</tr>
<tr>
<td>.253</td>
<td>-2</td>
<td>SLPv2 Protocol</td>
</tr>
<tr>
<td>.252</td>
<td>-3</td>
<td>MZAP Protocol</td>
</tr>
<tr>
<td>.251</td>
<td>-4</td>
<td>Multicast Discovery of DNS Services</td>
</tr>
<tr>
<td>.250</td>
<td>-5</td>
<td>SSDP</td>
</tr>
<tr>
<td>.249</td>
<td>-6</td>
<td>DHCPv4</td>
</tr>
<tr>
<td>.248</td>
<td>-7</td>
<td>AAP</td>
</tr>
<tr>
<td>.247</td>
<td>-8</td>
<td>MBUS</td>
</tr>
<tr>
<td>.246</td>
<td>-9</td>
<td>MADP (Example only: To be assigned by IANA)</td>
</tr>
</tbody>
</table>
IPv4 Scope Relative – Local Scope

<table>
<thead>
<tr>
<th>Address</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>239.255.255.255</td>
<td>SAP Session Announcement Protocol (SDR)</td>
</tr>
<tr>
<td>239.255.255.254</td>
<td>MADCAP Protocol</td>
</tr>
<tr>
<td>239.255.255.253</td>
<td>SLPv2 Protocol</td>
</tr>
<tr>
<td>239.255.255.252</td>
<td>MZAP Protocol</td>
</tr>
<tr>
<td>239.255.255.251</td>
<td>Multicast Discovery of DNS Services</td>
</tr>
<tr>
<td>239.255.255.250</td>
<td>SSDP</td>
</tr>
<tr>
<td>239.255.255.249</td>
<td>DHCPv4</td>
</tr>
<tr>
<td>239.255.255.248</td>
<td>AAP</td>
</tr>
<tr>
<td>239.255.255.247</td>
<td>MBUS</td>
</tr>
<tr>
<td><strong>239.255.255.246</strong></td>
<td><strong>MADP (Example only: To be assigned)</strong></td>
</tr>
</tbody>
</table>
IPv4 Scope Relative – Org-Local Scope

<table>
<thead>
<tr>
<th>Address</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>239.192.0.0</td>
<td>Org-Local Scope</td>
</tr>
<tr>
<td>239.0.0.0</td>
<td>SAP Session Announcement Protocol (SDR)</td>
</tr>
<tr>
<td>239.195.255.255</td>
<td>MADCAP Protocol</td>
</tr>
<tr>
<td>239.195.255.253</td>
<td>SLPv2 Protocol</td>
</tr>
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</tbody>
</table>

(Not to scale.)
**IPv6 MADP**

- Operates in the same fashion
- **Scope Addressing much easier**
  - Uses Scope Bits in IPv6 address
Why not use existing protocols?

- DNS – Domain Name Service
- SAP – Service Announcement Protocol
- SLP – Service Location Protocol
- Other?
Reasons to not use DNS

• DNS
  – Application is *still* dependent on external service (DNS Server, DNS Database) being configured before it can be deployed!
  • *NON-STARTER!*
Reason to not use SAP.

- **SAP**
  - Client could be swamped/flooded by SAP announcements for unwanted info
  - No way to request an announcement, so you have to send rapid announcements or wait for a long time
  - Parsing of SDP adds a lot of complexity
  - Overall SDP/SAP RFC size can scare off application developers
    - “Man, I don’t have time to read all of that stuff”
  - Remember: We want something super simple
Reasons to not use SLP

• SLP
  – Too complex for what is required
    • Highly unlikely to be adopted by app developers
  – Application is still dependent on external service (SLP Server) being configured before it can be deployed!
    • NON-STARTER!
Reasons to not use other approaches

• Other
  – In general, the application is *still* dependent on an external service being configured before it can be deployed!
  • *NON-STARTER!*
MADP Details

• Packet Format
  – Sequence of TLV’s

  +--------+--------+--------+--------+
  | Type   | Length | Value  |
  +--------+--------+--------+
  0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1

• Types: Specifies the type
• Length: Specifies the length of the value field
• Value: Must always be of the specified length
  – If length = 0, value field is not included
MADP Details

- **Types**
  - (0) Request: Indicates packet is a Request
  - (1) Response: Indicates packet is a Response
  - (2) Request Name: Uniquely identifies application
  - (3) Vendor Name/ID (opt): Further ID’s application
  - (4) Client ID (opt): ID’s Client
  - (5) Request ID (opt): ID’s Request
    - If present in Request, returned in Response
  - (6) Multicast Group: Multicast Group Information
    - Used in Response only
    - May appear multiple times when more than one multicast address is in use by application
MADP Details

- **Multicast Group Type Data (Value field)**

  - Number of Srcs: Nonzero for SSM Support
  - Group Adr: Multicast Group Address
  - Source Address(es) (opt): Source Addresses
MADP Example

Application Foo uses 3 groups

App "Blah"
Server

Request

Multicast

(0)Request
(2)Request Name: “App Foo”
(3)Vendor ID: “Mr. Bill’s Software”
(4)Client ID: “Bubba”
(5)Request ID: 0x0123

App “Foo”
Client “Bubba”

Multicast Address Discovery Protocol 2007
MADP Example

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App “Foo”
Client “Bubba”

Multicast

(0)Request
(2)Request Name: “Foo”
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MADP Example

Application Foo uses 3 groups

App “Foo”
Client “Bubba”

App “Blah”
Server

Multicast

(0) Request
(2) Request Name: “Foo”
(3) Vendor ID: “Mr. Bill’s Software”
(4) Client ID: “Bubba”
(5) Request ID: 0x0123

App “Foo”
Server

Match
MADP Example

Application Foo uses 3 groups

(1)Response
(2)Request Name: “Foo”
(3)Vendor ID: “Mr. Bill’s Software”
(4)Client ID: “Bubba”
(5)Request ID: 0x0123
(6)Multicast Group: 239.225.100.1
(6)Multicast Group: 239.225.200.1
(6)Multicast Group: 239.225.200.2

Unicast
Discussion?

Assuming you didn’t speak up already. ;-)