                   ILMI-Based Server Discovery for ATMARP

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Abstract

   This memo defines how ILMI-based Server Discovery, which provides a
   method for ATM-attached hosts and routers to dynamically determine
   the ATM addresses of servers, shall be used to locate ATMARP servers.

1. Introduction

   Presently, configuring a host or router to use ATMARP [1] is
   cumbersome and error-prone since it requires at least one ATM address
   to be statically configured on each host or router in the network.
   Further, it is impossible to implement a diskless host to use ATMARP
   since local configuration is required. ILMI-based Server Discovery,
   hereafter referred to as "server discovery," provides a solution to
   these problems.

   A brief overview of the Integrated Local Management Interface (ILMI)
   and the Service Registry MIB, as defined by the ATM Forum, are
   provided in this memo. The reader should consult [2] for a complete
   description of ILMI and this MIB, but the information contained here
   is sufficient for an understanding of its use to support ATMARP
   server discovery.

2. Integrated Local Management Interface

   The Integrated Local Management Interface (ILMI) [2] provides a
   mechanism for ATM-attached devices, such as hosts, routers, and ATM
   switches, to transfer management information. It is based on the
   Simple Network Management Protocol (SNMP), Version 1, and supports

get, get-next, set and trap operations.

The ILMI specification designates the switch side of the ATM link as
the 'network side' and the host/router side of the ATM link as the '
user side.' The Service Registry MIB, which is outlined in Section 3,
is implmented on the network side and is queried from the user side.

3. ILMI 4.0 Service Registry MIB

Server discovery utilizes the Service Registry MIB defined by the ATM
Forum in ILMI Specification Version 4.0 [2]. To support the existing
framework for IP over ATM, ATM switches must support the Service
Registry MIB.

A row in the service registry table [2] is defined as:

```
AtmfSrvcRegEntry ::= SEQUENCE {
    atmfSrvcRegPort          INTEGER,
    atmfSrvcRegServiceID     OBJECT IDENTIFIER,
    atmfSrvcRegATMAddress    AtmAddress,
    atmfSrvcRegAddressIndex  INTEGER,
    atmfSrvcRegParm1         OCTET STRING
}
```

The definition of each field in this structure is:

atmfSrvcRegPort - The ATM port number for which this entry
    contains management information. The value of zero may be used
    to indicate the ATM interface over which a management request
    was received.

atmfSrvcRegServiceID - This is the service identifier that
    uniquely identifies the type of service at the address
    provided in the table. (See Section 3.2 for ATMARP OID.)

atmfSrvcRegATMAddress - This is the full address of the service.
    The ATM client will use this address to establish a connection
    with the service.

atmfSrvcRegAddressIndex - An arbitrary integer to differentiate
    multiple rows containing different ATM addresses for the same
    service on the same port.

atmfSrvcRegParm1 - An octet string whose size and meaning is
    determined by the value of atmfSrvcRegServiceID.

The service registry table is indexed by atmfSrvcRegPort,
atmfSrvcRegServiceID and atmfSrvcRegAddressIndex.

3.1 Service Parameter String

   A generic parameter string is defined in the service registry table,
   thus allowing protocol-specific parameters to be specified. To be
   consistent with [1], the parameter string for ATMARP shall be:

        ar$pro   16   bits   Protocol type
        ar$plen 8   bits   Length of protocol address
        ar$addr plen octets   Network address
        ar$mask plen octets   Network mask

   Where

        ar$pro - see Assigned Numbers for protocol type number for
                  protocol using ATMARP. (IPv4 is 0x0800, IPv6 is 0x86DD)

        ar$plen - Length of the protocol address. (IPv4 is 4, IPv6 is 16)

        ar$addr - Network address represented in network byte order

        ar$mask - Network mask represented in network byte order

3.2 Service Object Identifier

   This OID, assigned in the ATM Forum Service Registry MIB, names
   ATMARP within the context of server discovery.

    atmfSrvcRegATMARP OBJECT IDENTIFIER ::= { 1.3.6.1.4.1.353.1.5.3 }

   It does not name any managed objects, rather is used to locate
   appropriate rows in the service registery table.

4. ATMARP Client Behavior

   An ATMARP client will access the service registry table via ILMI
   using the SNMP GetNext operator to "sweep" (SNMP parlance for a
   linear search) beginning with {Port = 0, ServiceID = <see Section
   3.2>, Index = 0} while holding the port number and the serviceID
   constant. (Port number 0 is used within ILMI to indicate "this
   port.")

   An ATMARP client with no local configuration, such as a diskless
   workstation, must use the row with the lowest index value if multiple
   ATMARP servers, possibly for multiple networks, are listed.

   ATMARP clients that have local IP configuration must use a row that
   has the appropriate IP address. For example, consider the case where
   an IP router has 3 logical interfaces defined on a single physical

interface with IP addresses 1.0.0.1/8, 128.10.0.1/16 and
171.69.150.226/24. The router will sweep the service registry table
looking for rows that have atmfSrvcRegParm1 values as shown below:

```
    Network number/mask   atmfSrvcRegParm1
    ------------------- ------------------------------------
    1.0.0.0/8             08 00   04   01 00 00 00   ff 00 00 00
    128.10.0.0/16         08 00   04   80 0a 00 00   ff ff 00 00
    171.69.150.0/24       08 00   04   ab 45 96 00   ff ff ff 00
```

When the correct atmfSrvcRegParm1 values are located, the router may
then establish an SVC to the selected server and perform the
appropriate protocol operations.

Redundant ATMARP servers are supported with multiple rows in the
service registry table. This list of ATMARP servers is ordered with
the primary ATMARP server having the lowest index value. The ATMARP
client must attempt to utilize the primary ATMARP server before
utilizing a secondary ATMARP server. Administrators must ensure that
the listed ATMARP servers are synchronized.

5. ATMARP Server Behavior

An ATMARP server shall be locally configured. The ATMARP server may
retrieve the ATMARP service registry data to validate the results. If
an incorrect row is retrieved the error may be flagged in a locally
significant way.

6. Relationship with PNNI Augmented Routing

An augmented version PNNI ("PNNI Augmented Routing," or PAR) [3] has
been developed by the ATM Forum. PAR can distribute data such as
ATMARP server addresses. Further, the ATM Forum is developing a proxy
mechanism for PAR (Proxy PAR) that would allow a UNI-attached host or
router to access PAR data without a full PAR implementation. These
mechanisms offer a promising way to manage the service registry
tables maintained on each switch in an ATM network, yet would not
require changes to the mechanism defined in this memo. Hosts and
routers can continue to utilize ILMI-based or Proxy PAR-based server
discovery and network administrators could manage the service
registry data with local configuration or via PAR and Proxy PAR.

7. Security Considerations

   The server discovery mechanism is built on the ILMI managment
   framework and the security embodied in that framework. Access, to
   user- or network-side information is controlled by MIB design rather
   than protocol security mechanisms.

   The service registery MIB, the table containing information for
   server discovery, is defined in [2] with read-only access. This means
   that any user-side device may query the service registry, but may not
   modify the service registry via ILMI. Instead, the sevice registry
   table must be modified via local configuration on the ATM switch.

References

   [1] Laubach, M. and J. Halpern, "Classical IP and ARP over ATM," RFC
        2225, April 1998.

   [2] ATM Forum, "Integrated Local Management Interface (ILMI)
        Specification Version 4.0," af-ilmi-0065.000, September 1996.

   [3] ATM Forum, "PNNI Augmented Routing (PAR) Version 1.0," af-ra-
        0104, January 1999.

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