Service Location Protocol for MANET (SLPManet)

User Manual

April 2005

Mohamed M. Abou El Saoud
moaz@sce.carleton.ca

Department of Systems & Computer Engineering
Carleton University

1 Required Files

First, the NS-2 simulator must be installed. Download the NS-2 package from http://www.isi.edu/nsnam/ns/, and type **`./install`** in the extraction folder: **`ns-allinone-2.27/`**.

In the SLPManet Package, **`SLPManet.zip`**, there are two directories. The first is the **`slp/`** directory which contains all source code. It consists of the following seven files:

```
1) udp-slp.h
2) udp-slp.cc
3) slp-sa.h
4) slp-sa.cc
5) slp-ua.h
6) slp-ua.cc
7) slp-common.h
```

The second directory is the **`slp_misc/`** directory, and which contains the NS-2 files that need to be altered in order to support SLPManet. The directory consists of the following seven files:

```
FILE                    Destination
-----------------------------------
1)  packet.h          -> common/.
2)  ns-packet.tcl     -> tcl/lib/.
3)  agent.h           -> common/.
4)  app.h             -> apps/.
5)  ns-default.tcl    -> tcl/lib/.
6)  cmu-trace.h       -> trace/.
7)  cmu-trace.cc      -> trace/.
8)  replaceFiles.bat
```

2 Installation Steps

In order to install SLPManet, perform the following steps:

1. Copy **`SLPManet.zip`** to **`ns-2.27/.`**
2. Extract the source files: **`unzip SLPManet.zip`**.
3. Add SLPManet support to current NS-2 files by pursuing Option 1 or 2 described below.
4. Modify the top-level **`Makefile.in`** by adding: **`slp/udp-slp.o`**, **`slp/slp-sa.o`**, and **`slp/slp-ua.o`** to the compilation list.
5. Under **`ns-2.27/`** type **`./configure`**.
6. Under **`ns-2.27/`** type **`make clean`** to remove all *.obj files.
7. Under **`ns-2.27/`** type **`make`** to finally compile the new simulator.

Option 1

Our SLPManet implementation works with any Ad Hoc Routing protocol that supports multicasting. Option 1 will pursue installation of SLPManet assuming an underlying BCAST [1] routing protocol. If you do have extra

NS-2 components installed (other than BCAST), or planning to use a different routing protocol, you must pursue Option 2.

The files in the **slp_misc** directory are based on a plain NS-2 installation with BCAST support only. The script **replaceFiles.bat** copies these files to the intended destinations.

3a. Install BCAST by following the instructions in:
http://kunz-pc.sce.carleton.ca/Thesis/README.ns2code.txt

3b. Under **slp_misc/**, execute **./replaceFiles.bat** to update the NS-2 files.

Option 2

You will need to look in files under the directory **slp_misc** for SLPManet-specific code and merge it to your existing NS-2 files. SLPManet-specific code is annotated with the word **''SLP''** in these files (to facilitate a 'grep').

3a. Register SLPManet application header by modifying **common/packet.h** and **tcl/lib/ns-packet.tcl**

3b. Add **supportSLP()** and **enableSLP()** methods to the **Agent** class in **common/agent.h**.

3c. Add **recv_slpmsg** method to the **Application** class in **apps/app.h**.

3d. Set default values for the newly introduced configurable parameters in **tcl/lib/ns-default.tcl**.

3e. To support more meaningful trace file output, add necessary routines to **cmu-trace.cc** and **cmu-trace.h** in **trace/**.

3f. Comment out the **#include BCAST** line in **slp/slp-common.h** if you are not intending to use BCAST.

3 SLPManet Commands

The following commands are used to set up SLPManet in simulation scripts:

`set $udpagent [new Agent/UDP/UDPSlp]`

Creates a UDP agent that is capable of sending and receiving SLPManet packets to and from the SLPManet application layer. Note that original UDP agents in NS-2 are not capable of handling application data.

`$udpagent packetSize_` <**`pkt size in bytes`**>

Sets the maximum size of the datagram sent by the UDP agent. Command is optional; default is 1400 bytes.

`$udpagent ttl_` <**`ttl value`**>

Sets the time-to-live of UDP packets. Command is optional; default is 255 hops.

`set $slpua [new Application/SLPua]`

Creates an SLPManet User Agent (UA).

`set $slpsa [new Application/SLPsa]`

Creates an SLPManet SA.

`$slpua set dst_port_` <**`slp listening port`**>

Sets `slpua`'s listening port. The command is applicable to UAs only. Command is optional; default port is 18.

`$slpagent set pktsize_` <**`pkt size in bytes`**>

Sets the maximum size of the packet sent by `slpagent`. The command is applicable to both UAs and Service Agents (SAs). Command is optional; default size is 1400 bytes.

`$slpagent start`

Enables the `slpagent` to take part in service discovery. The command is

applicable to both UAs and SAs.

$slpagent add-scope <**scope-name**>

Configures `slpagent` with <`scope-name`>. If no scope is added by the time `slpagent` is enabled, SAs configure themselves with the "DEFAULT" scope. However, if UAs are not configured with a scope by the time they are enabled, they will have no configured scopes, and must solicit Service Advertisements (SAAdverts) to learn scopes in the vicinity (i.e. User-Selectable Scopes mode). The command is applicable to both UAs and SAs.

$slpagent remove-scope <**scope-name**>

Removes <`scope-name`> from the scopes configured for `slpagent`. The command is applicable to both UAs and SAs.

$slpsa add-service <**url**> <**srv lifetime**> <**url lifetime**>

Adds a service with service URL, <`url`>, to `slpsa`. This service is valid at the SA node for <`srv lifetime`> seconds from the time the command is issued. The service URL advertised in Service Replys (SrvRplys) is only valid for <`url lifetime`> seconds from the time the SrvRply is received by the UA. The command is only applicable to SAs.

$slpua rqst-service <**service type**> <**multicast address**>

Multicasts to <`multicast address`> a SrvRqst for <`service type`>. The command is only applicable to UAs.

$slpua rqst-service service:service-agent <**multicast address**>

Multicasts to <`multicast address`> a SrvRqst that solicits SAAdverts. This command is used if the UA was not configured with any scopes, and User-Selectable scopes are desired. UAs will configure themselves with the scopes learned from SAAdverts. The command is only applicable to UAs.

$slpua set maxSearch_ <true/false>

Allow the UA to either use the first SrvRply received, or collect as many as possible (i.e. until maximum datagram size is reached, or no further replies, or MC_CONFIG_MAX has elapsed). The command is applicable to UAs only. Command is optional; default is false.

References

[1] T. Kunz, "Multicasting in mobile ad-hoc networks: Achieving high packet delivery ratios," in *Proceedings of the 2003 Center for Advanced Studies Conference (CAS)*, (Toronto, Canada), pp. 156–170, IBM Canada Ltd. Laboratory, Center for Advanced Studies, October 2003.