



## SIP for Toasters

### Naming and Accessing Network Appliances using extensions to the Session Initiation Protocol

**Prepared For:**

**SIP Seminar**



An SAIC Company

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# What is an Network Appliance (NA)?

(AKA: Internet Appliance or IP Appliance)

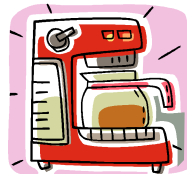
**Networked Appliance: n. A dedicated function consumer device containing a networked processor.**

Examples;

Lamps



Coffee Makers

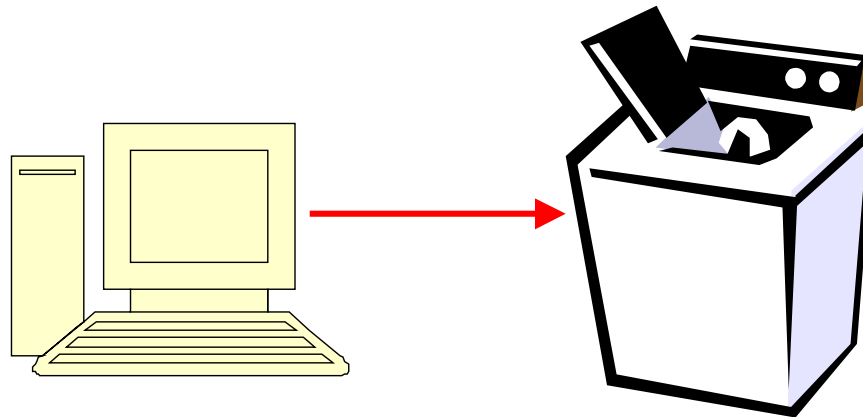


Alarm Clocks

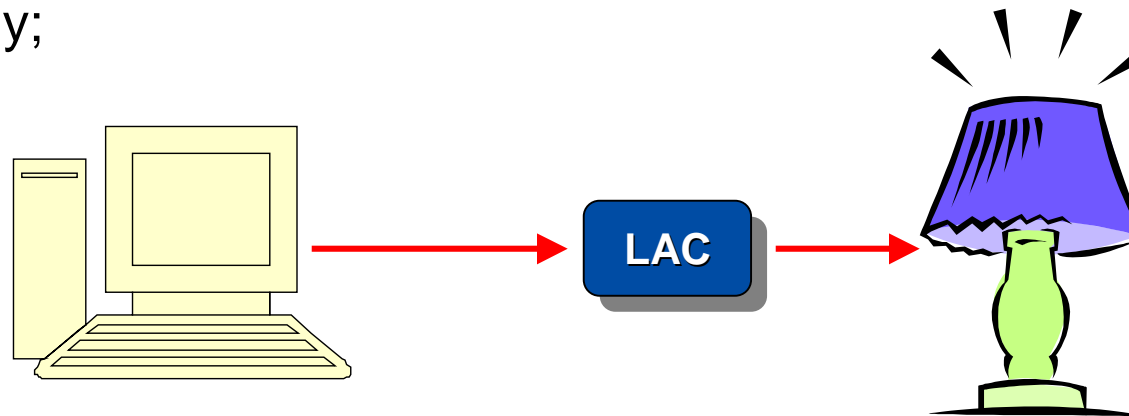


# How are NAs communicated with?

Directly;



Indirectly;



## Finding NAs...

- In the Local Area (within a home) NAs can be located using Service Location Protocol (SLP).
- SLP can operate in *Server* and *Serverless* modes, allowing good scalability from small systems towards larger ones.
- The syntax of SLP queries is very similar to that of Lightweight Directory Access Protocol (LDAP), but without *location* information - this makes it difficult to scale SLP outside of the local domain.
- There are other technologies besides SLP which could be used in the local area (e.g. JINI) but they suffer from similar problems of scaling.

## Access from the wide area...

- Imposes additional requirements of security and privacy on the communication into the home.
- Requires identification of the device within the home that the message is intended for, and cannot rely upon DNS to achieve this.
- May require many different device communication languages to be used.
- May have to work through a firewall or NAT type device.
- Cannot assume transparent IP numbering.

## The Proposal

To use SIP, with simple extensions, to meet the requirements for access to devices from the wide area.

This allows the re-use of the infrastructure that has been constructed for SIP in a whole new domain.

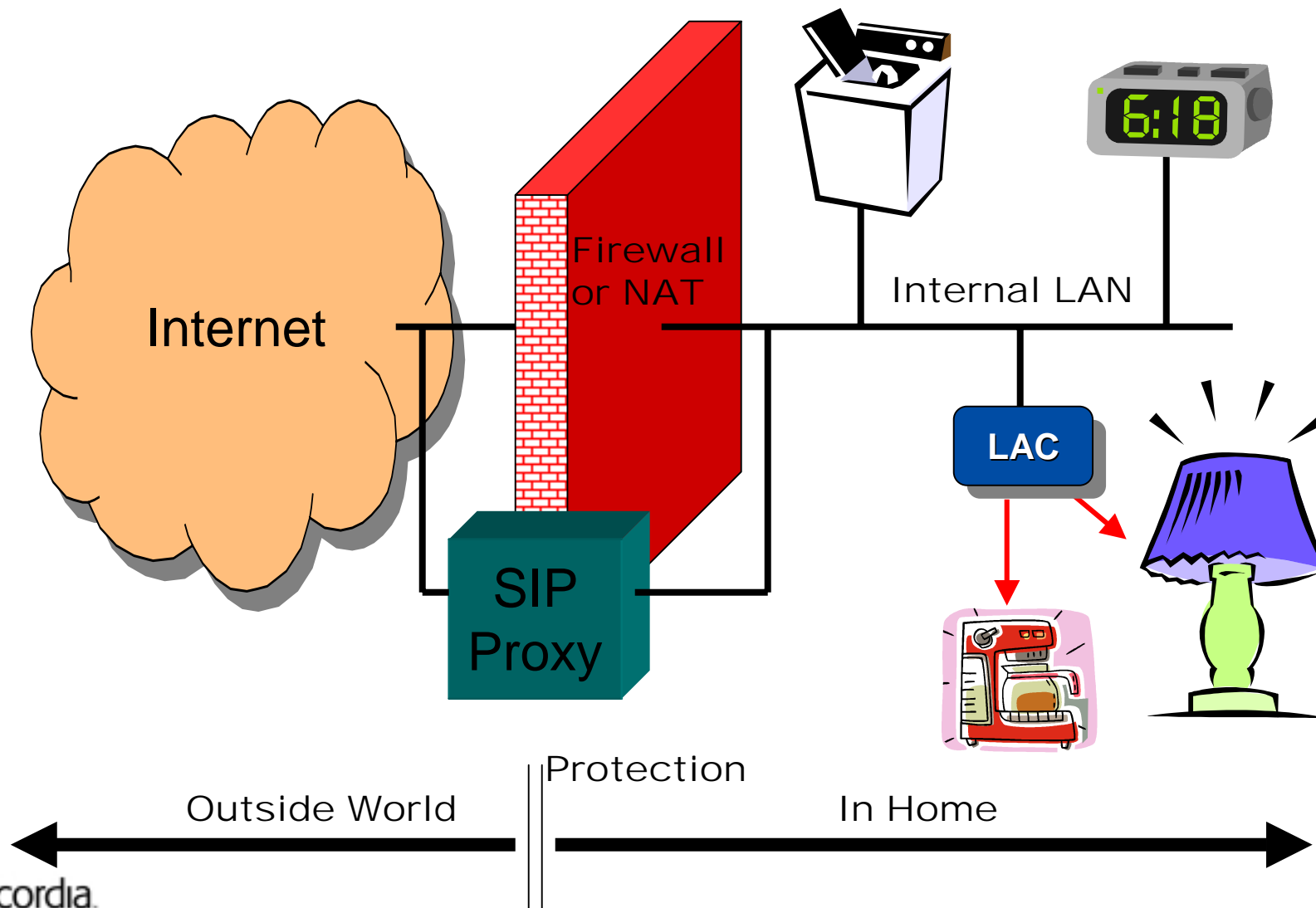
## SIP modification for use with NAs...

- It's a session protocol, it transports in the context of a *session* that is established (e.g. **INFO**).
  - Requires a new capability, called **MESSAGE**, which behaves similarly to **INVITE**, but does not explicitly set up a session - it simply delivers its payload to the UA and carries back the response.
- It uses DNS for lookup of endpoints.
  - Requires an additional information field to specify devices within the home.
- It only carries SDP payload.
  - Need to define new payloads (==new MIME types) which can carry the information required to excite NAs and which can carry responses back to the originator. We propose Device Control Protocol (DCP) as the type for this.

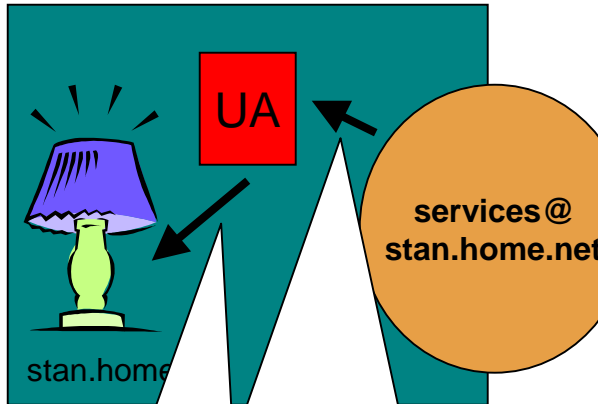
## Location in the home

- Your favorite location protocol encoded in the identifier field, e.g.;  
`slp:////d=lamp,r=bedroom`
- Standard SIP location part, e.g.;  
`@stan.home.net`
- Location protocol is encoded (and optionally encrypted) to allow it to be carried in a SIP URL, resulting in;  
`sip:a458fauzu3k3z@stan.home.net`
- End result; extensions to the protocol that can still use all of the feature and facilities of SIP, but can also address devices behind firewalls in a secure fashion....

# Accessing into the home...

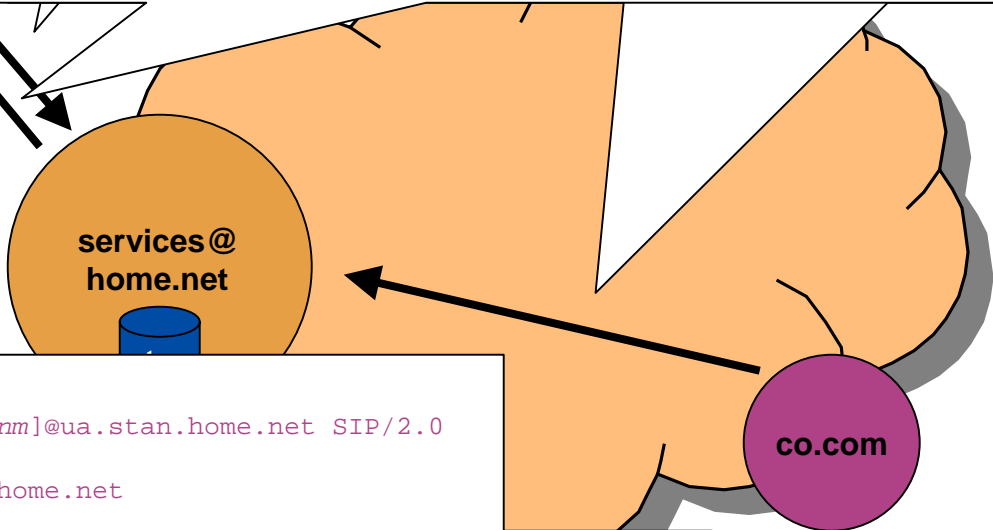


# Simple Example

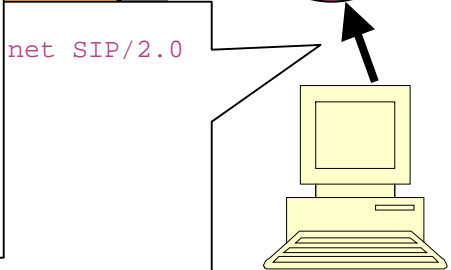


```
MESSAGE sip:[slp://d=lamp,r=bedroom,u=stanm]@stan.home.net SIP/2.0
From: sip:stan@co.com
To: sip:[slp://d=lamp,r=bedroom,u=stanm]@home.net
Via: home.net
Via: co.com
Via: anypc.co.com
Content-function: render
Content-type: application/dmp
<command><turn>On</turn></command>
```

(Routed using message content)  
<Action!!!>



```
MESSAGE sip:[slp://d=lamp,r=bedroom,u=stanm]@ua.stan.home.net SIP/2.0
From: sip:stan@co.com
To: sip:[slp://d=lamp,r=bedroom,u=stanm]@home.net
Via: stan.home.net
Via: home.net
Via: co.com
Via: anypc.co.com
Content-function: render
Content-type: application/dmp
<command><turn>On</turn></command>
```



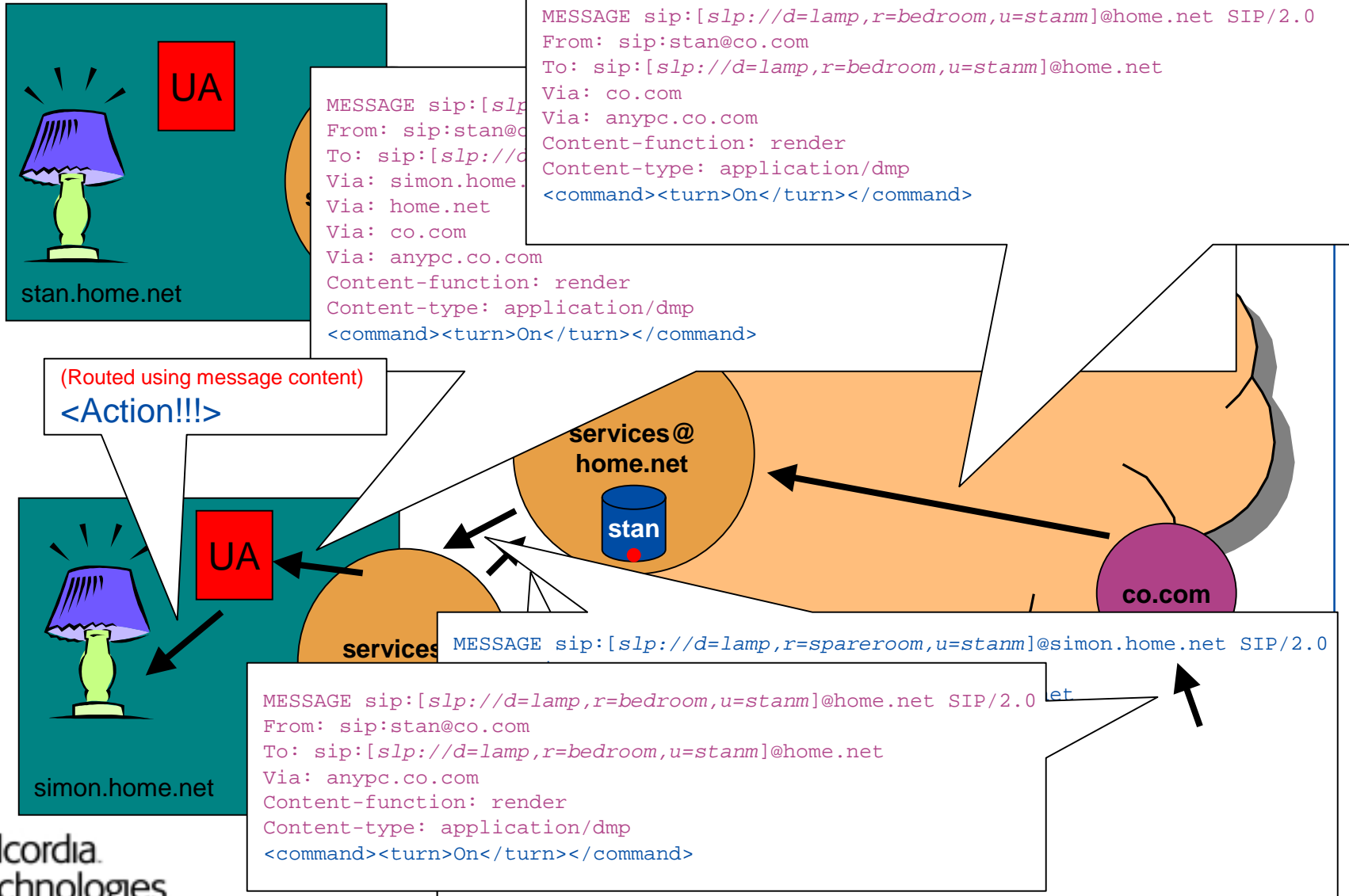
anypc.co.com

## Whoops....

Stan's software isn't quite so bug-free as he'd like it to be, and his bedroom lamp keeps switching itself on and off through the night. Eventually his better half throws him out of the house for a week to teach him a lesson. Simon takes pity on him ('cos he wrote the code and is feeling guilty) and lets Stan stay in his spare room.

Stan wants to finish debugging the code in order to restore marital harmony, so he wants requests for the bedroom lamp in his home to temporarily use the lamp in the spare room in Simon's home....

# With Redirection...



## In Conclusion....

- SIP can be used in the Networked Appliances space to provide wide area access to devices within a home.
- Using SIP allows springboarding off of the back of a lot of good work and ideas, especially in the security and reliability spaces.
- SIP needs a few small enhancements to allow it to be used in this fashion, but these modifications are simple and do not affect existing functionality.
- Telcordia is heavily involved in developing and prototyping these ideas in order to create proof of concept models for demonstration purposes.



*Performance from Experience*



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