IGRS – UPnP – DLNA
Coexistence and interoperability concerns
Anne Gérodolle
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summary

1. Short introduction of UPnP - DLNA

2. Concerns and suggestions
   - Coexistence
   - Interoperability

3. Other concerns
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UPnP - DLNA
UPnP

- UPnP forum (founded 1999) = more than 800 companies
- A "middleware" based on a set of protocols (↔ IGRS)
- "Device profiles" defined by working groups

- UIC (UPnP Implementers Corporation) develops and administers the testing and certification process
- created November 2001, 60 members
- 227 equipments certified in 2002-2005
Internet Gateway Working Committee

**Internet Gateway Device 2001-11-12**
- All devices and services required for a generic LAN / WAN Gateway
- NAT Control
  ⇒ 125 certified devices and many more compatible

**WLAN Access Point Device 2003-10-17**
- An ‘infrastructure’ network for home or small business.
- Configuring and querying 802.11 access point parameters.
- Setup security, manage authorization
  ⇒ 2 certified devices and many more compatible
UPnP AV Architecture 2002-06-25

- Media Server
  - Management and Navigation into a media content directory
  - Multistreaming delivery
  ⇒ 69 certified devices and many more compatible

- Media Renderer
  - Rendering control
  - Streaming reception
  ⇒ 28 certified devices and many more compatible

- Control Point
  - User control
  - Discovery, binding
  - May be colocalized with Media Renderer
DLNA : Digital Living Network Alliance

- Founded in 2003
- Several hundred companies
- Goal: deliver an interoperability framework of design guidelines based on open industry standards to complete the cross-industry digital convergence
DLNA guidelines

- DRM / content protection: technologies
  - DRM/CP
- Multimedia formats: jpeg, lpcm, mpeg2
  - optional: png, gif, tiff, mp3, …
- Transport: http
- Discovery/control: UPnP
- Protocol: IPv4 & IPv6
- Physical network: ethernet

*Media Format*
- JPEG, LPCM, MPEG2

*Device Discovery/Control, Media Management*
- UPnP AV 1.0
- UPnP Device Architecture 1.0

*Media Transport*
- HTTP 1.0/1.1

*Network Stack*
- IPv4 Protocol Suite

*Network Connectivity*
- Wired: 802.3i, 802.3u
- Wireless: 802.11a/b/g
Concerns and suggestions
Concerns

- 227 UPnP certified products, 89 DLNA certified products
  = many devices already on the market and deployed at consumer's home

- Coexistence
  - The presence of a IGRS device should not disturb UPnP devices and vice-versa

- Interoperability
  - Use of IGRS devices by UPnP control points
  - Use of UPnP devices by IGRS control points
  - Higher level inter-operability (e.g. AV)
Coexistence ?
UPnP Middleware

SSDP : Simple Service Discovery Protocol

<table>
<thead>
<tr>
<th>Protocol</th>
<th>GENA</th>
<th>SOAP</th>
</tr>
</thead>
<tbody>
<tr>
<td>SSDP</td>
<td></td>
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<tr>
<td>HTTPU</td>
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<td>HTTPMU</td>
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<td>HTTP</td>
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<td>UDP</td>
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<td>IP</td>
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5.5.2 Interoperability with UPnP
IGRS adopts and extends SSDP protocol as the base for device discovery, while SSDP protocol is also the base for device discovery in UPnP 1.0 specification. Therefore, IGRS devices support the discovery and interoperability with UPnP 1.0-compliant devices. The interoperability guideline of IGRS devices and UPnP devices is described in Chapter 11.

<table>
<thead>
<tr>
<th></th>
<th>UPnP</th>
<th>IGRS</th>
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</thead>
<tbody>
<tr>
<td>Multicast address</td>
<td>239.255.255.250:1900</td>
<td>239.255.255.250:1900</td>
</tr>
<tr>
<td>(search, notify)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>return address</td>
<td>Implicit*</td>
<td>Explicit 01-ListenerList</td>
</tr>
<tr>
<td></td>
<td>any port</td>
<td>3880 ?</td>
</tr>
</tbody>
</table>

*SSDP specs states: "Responses to ssdp:discover requests sent over the SSDP multicast channel/port are to be sent to the IP address/port the ssdp:discover request came from."
## SDDP : IGRS vs UPnP (2/2)

<table>
<thead>
<tr>
<th>Search filter</th>
<th>ST field</th>
<th>ST field</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ssdp:all</td>
<td>urn:schemas-IGRS-org:device:IGRS-device:1</td>
</tr>
<tr>
<td></td>
<td>upnp:rootdevice</td>
<td>urn:schemas-IGRS-org:service:IGRS-service:1</td>
</tr>
<tr>
<td></td>
<td>uuid:device-UUID</td>
<td>+ specific fields 01-01-SearchByServiceType…</td>
</tr>
<tr>
<td></td>
<td>urn:schemas-upnp-org:device:deviceType:v</td>
<td></td>
</tr>
<tr>
<td></td>
<td>urn:schemas-upnp-org:service:serviceType:v</td>
<td></td>
</tr>
<tr>
<td>packet length</td>
<td>Short</td>
<td>verbose</td>
</tr>
<tr>
<td></td>
<td>DLNA recommends packet size limit</td>
<td></td>
</tr>
</tbody>
</table>
SSDP : conclusion

- Use of SSDP in IGRS initially meant for interoperability purpose
- But IGRS "extended SSDP"
  - is not compatible with SSDP as used by UPnP
  - may threaten coexistence
- Suggestion : IGRS uses a different multicast address / port for "extended SSDP"
- Suggestion compatible with chapter 11 : "Interoperability Guideline between IGRS and UPnP"
  - Briefly : chapter 11 describes how a IGRS device that wants to be interoperable with UPnP should implement both IGRS and UPnP stacks
  - Stays valid even if different addresses/ports : same device uses
    - standard ssdp on 239.255.255.250:1900 to discover/notify UPnP devices
    - "extended ssdp" on IGRS address/port to discover/notify IGRS devices
Coexistence achieved if a different multicast address/port used for "extended SSDP"

Interoperability ?
Interoperability issues

- Many differences between IGRS and UPnP
  (see interoperability analysis made by the UPnP Technical Committee)
  - extended SSDP
  - Different Messages format, length and content
  - Different device / service description (WSDL vs DCPD/SCPD)
  - IGRS define original grouping, session mechanisms
  - Different security protocols

- Interoperability at control level difficult
  According to chapter 11 guidelines, same device should
  - implement both IGRS and UPnP stacks
  AND
  - manage both "profiles" (unless there is exact correspondence between models: does an UPnP AV media server have an exact IGRS equivalent ?)
Recommendations

- **Interoperability at control level: difficult**
  - need for the device or control point to manage both stacks **AND** to support both profiles

- **Interoperability between AV devices possible**
  - If IGRS AV profile use streaming protocols / media formats etc., as recommended by DLNA
  - a CP that "speaks" UPnP and IGRS could make a UPnP device and IGRS inter-operate even if AV profiles are different.
Other Concerns
Some points need to be explicated

- **e.g. use of 3880 port?**

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  - **01-SecureListenerList:**
    - optional field, type is string. format is “IP address:port”,
    - multi IP address:port are spaced by “;”
    - listening port is fixed at 3880

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  - **01-ListenerList:**
    - required field, type is string. format is “IP address:port”,
    - multi IP address:port are spaced by “;”
    - one of the port number in the list must be 3880

  **p 92**

  *Search response message of this device shall be sent in unicast through UDP (target port number: 3880).*
Security

- a liaison with ISO/IEC JTC1/SC27 is needed to insure the security standards are appropriately defined and sufficiently robust to meet the needs of this proposed project.
SOAP, WSDL versions

- SOAP 1.1 is not a W3C Recommendation (i.e. standard) but rather a W3C Note. The usage of SOAP 1.1 is therefore inappropriate for an IEC/ISO standard (See JTC1 Directives, Edition 5, Version 2, Annex N).
  Suggestion: migration to SOAP 1.2

- WSDL 1.1 is not a W3C Recommendation (i.e. standard) but rather a W3C Note. The usage of WSDL 1.1 is therefore inappropriate for an IEC/ISO standard (See JTC1 Directives, Edition 5, Version 2, Annex N).
  Suggestion: migration to WSDL 2.0
Thank you...