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Partie 26-1: Protocole de contrôle de dispositif de téléphonie — Niveau 2 — Architecture de téléphonie

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The list of all currently available parts of ISO/IEC 29341 series, under the general title *Information technology — UPnP Device Architecture*, can be found on the ISO web site.

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UPnP Document Title	ISO/IEC 29341 Part
UPnP Device Architecture 1.0	ISO/IEC 29341-1:2008
UPnP Device Architecture Version 1.0	ISO/IEC 29341-1:2011
UPnP Device Architecture 1.1	ISO/IEC 29341-1-1:2011
UPnP Device Architecture 2.0	ISO/IEC 29341-1-2
UPnP Basic:1 Device	ISO/IEC 29341-2
UPnP AV Architecture:1	ISO/IEC 29341-3-1:2008
UPnP AV Architecture:1	ISO/IEC 29341-3-1:2011
UPnP AVTransport:1 Service	ISO/IEC 29341-3-10
UPnP ConnectionManager:1 Service	ISO/IEC 29341-3-11
UPnP ContentDirectory:1 Service	ISO/IEC 29341-3-12
UPnP RenderingControl:1 Service	ISO/IEC 29341-3-13
UPnP MediaRenderer:1 Device	ISO/IEC 29341-3-2
UPnP MediaRenderer:2 Device	ISO/IEC 29341-3-2:2011
UPnP MediaServer:1 Device	ISO/IEC 29341-3-3
UPnP AVTransport:2 Service	ISO/IEC 29341-4-10:2008
UPnP AVTransport:2 Service	ISO/IEC 29341-4-10:2011
UPnP ConnectionManager:2 Service	ISO/IEC 29341-4-11:2008
UPnP ConnectionManager:2 Service	ISO/IEC 29341-4-11:2011
UPnP ContentDirectory:2 Service	ISO/IEC 29341-4-12
UPnP RenderingControl:2 Service	ISO/IEC 29341-4-13:2008
UPnP RenderingControl:2 Service	ISO/IEC 29341-4-13:2011
UPnP ScheduledRecording:1	ISO/IEC 29341-4-14
UPnP ScheduledRecording:2	ISO/IEC 29341-4-14:2011
UPnP MediaRenderer:2 Device	ISO/IEC 29341-4-2
UPnP MediaServer:2 Device	ISO/IEC 29341-4-3
UPnP AV Datastructure Template:1	ISO/IEC 29341-4-4:2008
UPnP AV Datastructure Template:1	ISO/IEC 29341-4-4:2011
UPnP DigitalSecurityCamera:1 Device	ISO/IEC 29341-5-1
UPnP DigitalSecurityCameraMotionImage:1 Service	ISO/IEC 29341-5-10
UPnP DigitalSecurityCameraSettings:1 Service	ISO/IEC 29341-5-11
UPnP DigitalSecurityCameraStillImage:1 Service	ISO/IEC 29341-5-12
UPnP HVAC_System:1 Device	ISO/IEC 29341-6-1
UPnP ControlValve:1 Service	ISO/IEC 29341-6-10
UPnP HVAC_FanOperatingMode:1 Service	ISO/IEC 29341-6-11
UPnP FanSpeed:1 Service	ISO/IEC 29341-6-12
UPnP HouseStatus:1 Service	ISO/IEC 29341-6-13
UPnP HVAC_SetpointSchedule:1 Service	ISO/IEC 29341-6-14
UPnP TemperatureSensor:1 Service	ISO/IEC 29341-6-15
UPnP TemperatureSetpoint:1 Service	ISO/IEC 29341-6-16

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UPnP HVAC_UserOperatingMode:1 Service	ISO/IEC 29341-6-17
UPnP HVAC_ZoneThermostat:1 Device	ISO/IEC 29341-6-2
UPnP BinaryLight:1 Device	ISO/IEC 29341-7-1
UPnP Dimming:1 Service	ISO/IEC 29341-7-10
UPnP SwitchPower:1 Service	ISO/IEC 29341-7-11
UPnP DimmableLight:1 Device	ISO/IEC 29341-7-2
UPnP InternetGatewayDevice:1 Device	ISO/IEC 29341-8-1
UPnP LANHostConfigManagement:1 Service	ISO/IEC 29341-8-10
UPnP Layer3Forwarding:1 Service	ISO/IEC 29341-8-11
UPnP LinkAuthentication:1 Service	ISO/IEC 29341-8-12
UPnP RadiusClient:1 Service	ISO/IEC 29341-8-13
UPnP WANCableLinkConfig:1 Service	ISO/IEC 29341-8-14
UPnP WANCommonInterfaceConfig:1 Service	ISO/IEC 29341-8-15
UPnP WANDSLLinkConfig:1 Service	ISO/IEC 29341-8-16
UPnP WANEthernetLinkConfig:1 Service	ISO/IEC 29341-8-17
UPnP WANIPConnection:1 Service	ISO/IEC 29341-8-18
UPnP WANPOTSLinkConfig:1 Service	ISO/IEC 29341-8-19
UPnP LANDevice:1 Device	ISO/IEC 29341-8-2
UPnP WANPPPConnection:1 Service	ISO/IEC 29341-8-20
UPnP WLANConfiguration:1 Service	ISO/IEC 29341-8-21
UPnP WANDevice:1 Device	ISO/IEC 29341-8-3
UPnP WANConnectionDevice:1 Device	ISO/IEC 29341-8-4
UPnP WLANAccessPointDevice:1 Device	ISO/IEC 29341-8-5
UPnP Printer:1 Device	ISO/IEC 29341-9-1
UPnP ExternalActivity:1 Service	ISO/IEC 29341-9-10
UPnP Feeder:1.0 Service	ISO/IEC 29341-9-11
UPnP PrintBasic:1 Service	ISO/IEC 29341-9-12
UPnP Scan:1 Service	ISO/IEC 29341-9-13
UPnP Scanner:1.0 Device	ISO/IEC 29341-9-2
UPnP QoS Architecture:1.0	ISO/IEC 29341-10-1
UPnP QosDevice:1 Service	ISO/IEC 29341-10-10
UPnP QosManager:1 Service	ISO/IEC 29341-10-11
UPnP QosPolicyHolder:1 Service	ISO/IEC 29341-10-12
UPnP QoS Architecture:2	ISO/IEC 29341-11-1
UPnP QosDevice:2 Service	ISO/IEC 29341-11-10
UPnP QosManager:2 Service	ISO/IEC 29341-11-11
UPnP QosPolicyHolder:2 Service	ISO/IEC 29341-11-12
UPnP QOS v2 Schema Files	ISO/IEC 29341-11-2
UPnP RemoteUIClientDevice:1 Device	ISO/IEC 29341-12-1
UPnP RemoteUIClient:1 Service	ISO/IEC 29341-12-10
UPnP RemoteUIServer:1 Service	ISO/IEC 29341-12-11
UPnP RemoteUIServerDevice:1 Device	ISO/IEC 29341-12-2
UPnP DeviceSecurity:1 Service	ISO/IEC 29341-13-10
UPnP SecurityConsole:1 Service	ISO/IEC 29341-13-11
UPnP ContentDirectory:3 Service	ISO/IEC 29341-14-12:2011
UPnP MediaServer:3 Device	ISO/IEC 29341-14-3:2011

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UPnP ContentSync:1	ISO/IEC 29341-15-10:2011
UPnP Low Power Architecture:1	ISO/IEC 29341-16-1:2011
UPnP LowPowerProxy:1 Service	ISO/IEC 29341-16-10:2011
UPnP LowPowerDevice:1 Service	ISO/IEC 29341-16-11:2011
UPnP QoS Architecture:3	ISO/IEC 29341-17-1:2011
UPnP QosDevice:3 Service	ISO/IEC 29341-17-10:2011
UPnP QosManager:3 Service	ISO/IEC 29341-17-11:2011
UPnP QosPolicyHolder:3 Service	ISO/IEC 29341-17-12:2011
UPnP QosDevice:3 Addendum	ISO/IEC 29341-17-13:2011
UPnP RemoteAccessArchitecture:1	ISO/IEC 29341-18-1:2011
UPnP InboundConnectionConfig:1 Service	ISO/IEC 29341-18-10:2011
UPnP RADAConfig:1 Service	ISO/IEC 29341-18-11:2011
UPnP RADASync:1 Service	ISO/IEC 29341-18-12:2011
UPnP RATAConfig:1 Service	ISO/IEC 29341-18-13:2011
UPnP RAClient:1 Device	ISO/IEC 29341-18-2:2011
UPnP RAServer:1 Device	ISO/IEC 29341-18-3:2011
UPnP RADiscoveryAgent:1 Device	ISO/IEC 29341-18-4:2011
UPnP SolarProtectionBlind:1 Device	ISO/IEC 29341-19-1:2011
UPnP TwoWayMotionMotor:1 Service	ISO/IEC 29341-19-10:2011
UPnP AV Architecture:2	ISO/IEC 29341-20-1
UPnP AVTransport:3 Service	ISO/IEC 29341-20-10
UPnP ConnectionManager:3 Service	ISO/IEC 29341-20-11
UPnP ContentDirectory:4 Device	ISO/IEC 29341-20-12
UPnP RenderingControl:3 Service	ISO/IEC 29341-20-13
UPnP ScheduledRecording:2 Service	ISO/IEC 29341-20-14
UPnP MediaRenderer:3 Service	ISO/IEC 29341-20-2
UPnP MediaServer:4 Device	ISO/IEC 29341-20-3
UPnP AV Datastructure Template:1	ISO/IEC 29341-20-4
UPnP InternetGatewayDevice:2 Device	ISO/IEC 29341-24-1
UPnP WANIPConnection:2 Service	ISO/IEC 29341-24-10
UPnP WANIPv6FirewallControl:1 Service	ISO/IEC 29341-24-11
UPnP WANConnectionDevice:2 Service	ISO/IEC 29341-24-2
UPnP WANDevice:2 Device	ISO/IEC 29341-24-3
UPnP Telephony Architecture:2	ISO/IEC 29341-26-1
UPnP CallManagement:2 Service	ISO/IEC 29341-26-10
UPnP MediaManagement:2 Service	ISO/IEC 29341-26-11
UPnP Messaging:2 Service	ISO/IEC 29341-26-12
UPnP PhoneManagement:2 Service	ISO/IEC 29341-26-13
UPnP AddressBook:1 Service	ISO/IEC 29341-26-14
UPnP Calendar:1 Service	ISO/IEC 29341-26-15
UPnP Presense:1 Service	ISO/IEC 29341-26-16
UPnP TelephonyClient:2 Device	ISO/IEC 29341-26-2
UPnP TelephonyServer:2 Device	ISO/IEC 29341-26-3
UPnP Friendly Info Update:1 Service	ISO/IEC 29341-27-1
UPnP MultiScreen MultiScreen Architecture:1	ISO/IEC 29341-28-1
UPnP MultiScreen Application Management:1 Service	ISO/IEC 29341-28-10

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UPnP MultiScreen Screen:1 Device	ISO/IEC 29341-28-2
UPnP MultiScreen Application Management:2 Service	ISO/IEC 29341-29-10
UPnP MultiScreen Screen:2 Device	ISO/IEC 29341-29-2
UPnP IoT Management and Control Architecture Overview:1	ISO/IEC 29341-30-1
UPnP DataStore:1 Service	ISO/IEC 29341-30-10
UPnP IoT Management and Control Data Model:1 Service	ISO/IEC 29341-30-11
UPnP IoT Management and Control Transport Generic:1 Service	ISO/IEC 29341-30-12
UPnP IoT Management and Control:1 Device	ISO/IEC 29341-30-2
UPnP Energy Management:1 Service	ISO/IEC 29341-31-1

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1 Scope

This document describes an architecture that allows UPnP Telephony devices, services and control points defined in the propoded DCP to be deployed in the home network environment and to enable management of incoming and outgoing telephony calls, messaging, presence information and phone features configuration through UPnP means from devices within the home.

In order to accommodate the above mentioned goals, the Telephony Architecture defines several UPnP devices and services that can be embedded to the devices defined for telephony. The architecture model describes interaction among the telephony devices, services and control points. The architecture also describes various deployment scenarios.

The architecture does not describe any interfaces to “service” gateways that will enable non-UPnP entities to interact with the UPnP devices, services and control points physically attached to the home network.

2 Normative references

[1] – UPnP Device Architecture, version 1.0, UPnP Forum, October 15, 2008. Available at: http://www.upnp.org/specs/arch/UPnP-arch-DeviceArchitecture-v1.0-20081015.pdf. Latest version available at: http://www.upnp.org/specs/arch/UPnP-arch-DeviceArchitecture-v1.0.pdf.

3 Terms, definitions and abbreviated terms

For the purposes of this document, the terms and definitions given in [1] and the following apply.

3.1 Provisioning terms

3.1.1

conditionally allowed
CA
The definition or behavior depends on a condition. If the specified condition is met, then the definition or behavior is allowed, otherwise it is not allowed.

3.1.2

conditionally required
CR
The definition or behavior depends on a condition. If the specified condition is met, then the definition or behavior is required, otherwise it is not allowed.

3.1.3

not allowed
The definition or behavior is prohibited by this specification. Opposite of required.

3.2 Symbols

3.2.1

::
signifies a hierarchical parent-child (parent::child) relationship between the two objects separated by the double colon. This delimiter is used in multiple contexts, for example: Service::Action(), Action()::Argument, parentProperty::childProperty.

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3.3 General telephony terms

3.3.1

Telephony Server
TS
a logical device that provides common telephony features (e.g. call/video call, messaging, address book) via UPnP to other devices in the home network. A TS is usually connected to a telephony service on its WAN interface, either wire line or mobile. For example, a TS may be a mobile phone or a home gateway with VoIP features.

3.3.2

Telephony Client
TC
a networked logical device that allows the user to enjoy the telephony features provided by the Telephony Server via UPnP. A TC may usually provide input/output features for voice and video. An example of a TC is a networked TV Set.

3.3.3

Telephony Control Point
TelCP
a software feature able to control the functionalities of both TS and TC. It may be embedded in a TS, a TC or also being a physical device on its own.

3.3.4

InputConfig Control Point
ICP
a software feature that is able to control the functionalities of UPnP devices to be used to provide user-friendly input features. The control here refers to getting capabilities of UPnP dveices to be used for input, matching capabilities and selecting the appropriate dveice role such as receving side or sending side etc.

3.3.5

InputConfig Service
IS
a software feature that is able to provide user-friendly input capability via UPnP means and expose interfaces to describe capabilities of sender/receiver of devices to be used for input services and setup the input session between the devices using the matching profile (capability) from the ICP .

4 Text conventions

- Strings that are to be taken literally are enclosed in “double quotes”.
- Words that are emphasized are printed in *italic*.
- Keywords that are defined by the UPnP Working Committee are printed using the *forum* character style.
- Keywords that are defined by the UPnP Device Architecture are printed using the **arch** character style.

5 Introduction

The objective of the UPnP Telephony specification is to provide a means for interactions between telephony devices and other (non-telephony) devices, without using native telephony

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features, but exploiting UPnP features of the phone device (e.g. messaging, calling, presence, etc.).

An examtple of such a scenario, for a calling use case, is shown in Figure 1 where a Phone device communicates with a non-phone (TV) using UPnP interaction model. The non-phone device as shown here is a TV, and using UPnP mechanism can control the phone device which receives call from outside of the home network via non-UPnP means. However, this phone device can make the media session for this call available in the UPnP network to other non-phone device via UPnP mechanism. The non-phone device can have a control point that can control this media session via UPnP control mechanism on the phone device. The phone device and the non-phone device establishes media session for the call between them and this media session gets established using UPnP command and control mechanism.

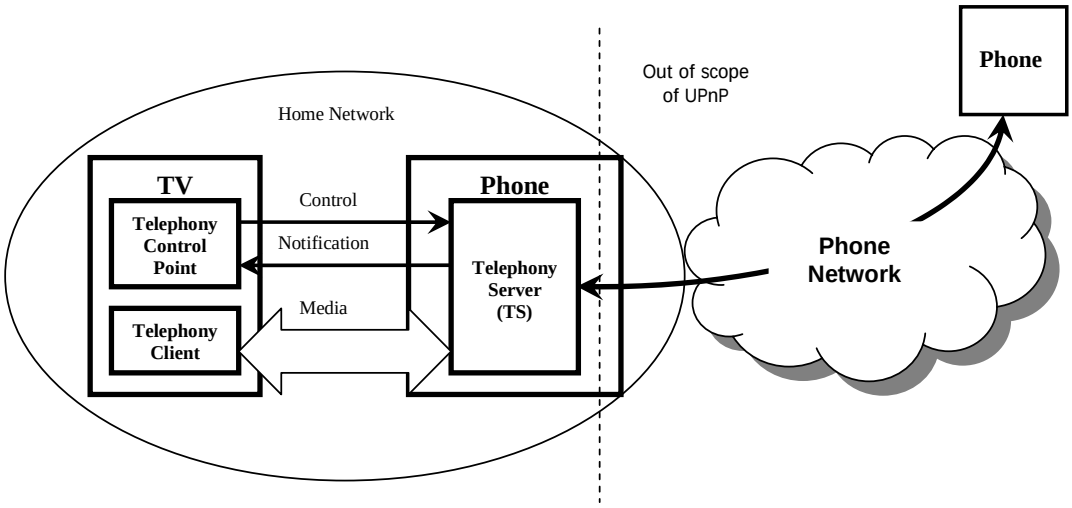

Figure 1 — UPnP Telephony Basic Architecture

Also the other use cases such as messaging, managing local presence, managing contacts and accessing presence information, and managing the phone configuration are addressed by the Telephony DCP according to this basic architecture model.

Note that the interaction of actual telephony call with a callee or a caller, on any kind of telecommunication network (PSTN/ISDN, Mobile, Internet), is handled by the phone device and is out of scope of this specification.

6 Telephony Reference Architecture

6.1 Telephony Basic Architecture Paradigm

Clause 6 describes the basic architectural model for telephony features.

The basic architecture for UPnP telephony features can be described in a 3-box model which is shown below in Figure 2. Figure 2 represents a 3-box model where the Telephony Control Point (TelCP) resides on a box outside of the Telephony Server (TS) and the Telephony Client (TC). The Telephony Control Point (TelCP) discovers both the Telephony Client (TC) and the Telephony Server (TS) and can establish the media session between them. And can control the media session between the Telephony Client (TC) and the Telephony Server (TS). This model can be collapsed into a 2-box model by having the Telephony Control Point (TelCP) reside either in the Telephony Server (TS) or the Telephony Client (TC). The Telephony Control Point (TelCP) can also directly interact with the Telephony Server (TS) without needing an interaction with a Telephony Client (TC) or without residing in the

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Telephony Client (TC). This is the case when realizing a number of features such as presence and messaging services, notifications, initiating a call etc.

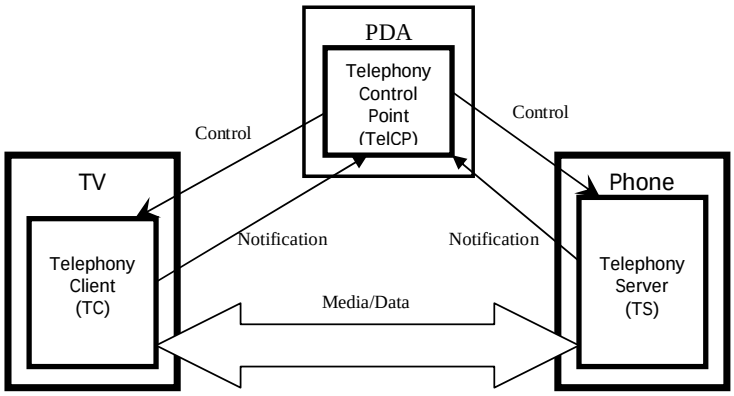

Figure 2 — Architecture with a Telephny Control Point (TelCP) on an independent Device (3-Box Model)

Figure 3 shows a more detailed view on the interactions between a Telephony Control Point (TelCP), a Telephony Server (TS) and a Telephony Client (TC). The Telephony Server (TS) and the Telephony Client (TC) are UPnP devices. A Telephony Client (TC) and a Telephony Server (TS) devices consists of a set of services and the Telephony Control Point (TelCP) basically interacts with the services using UPnP actions. The actual communication between TC and TS devices for media streams is performed out-of-band with respect to UPnP protocols.

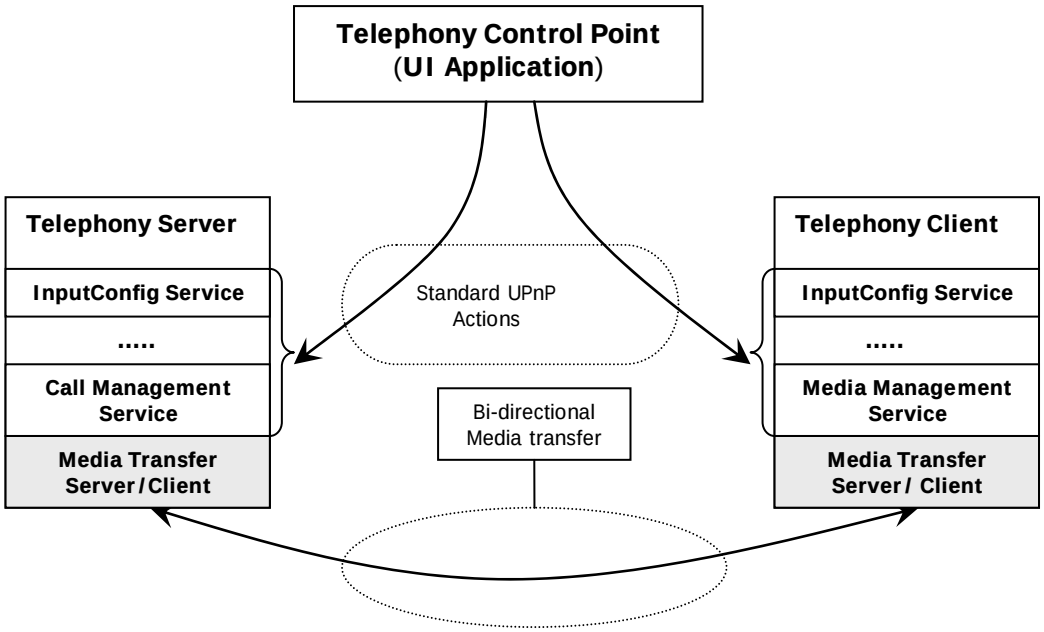

Figure 3 — Service Level Architectural View

Figure 3 shows the service level interaction model using UPnP actions. The various services as defined for the telephony featuures expose interfaces forthe Telephony Control Point (TelCP) to access those services.

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6.2 Telephony Components Overview

Subclause 6.2 provides an overview of the Telephony architecture components in terms of UPnP devices and UPnP services that this Telephony specification defines. The architecture defines two different UPnP devices: Telephony Server (TS) Device and Telephony Client (TC) Device. There are a number of UPnP services that are defined which include: Media Management Service, Call Management Service, Messaging Service, Phone Management via Data Model and UPnP Device Management, InputConfig Service, and Security Service.

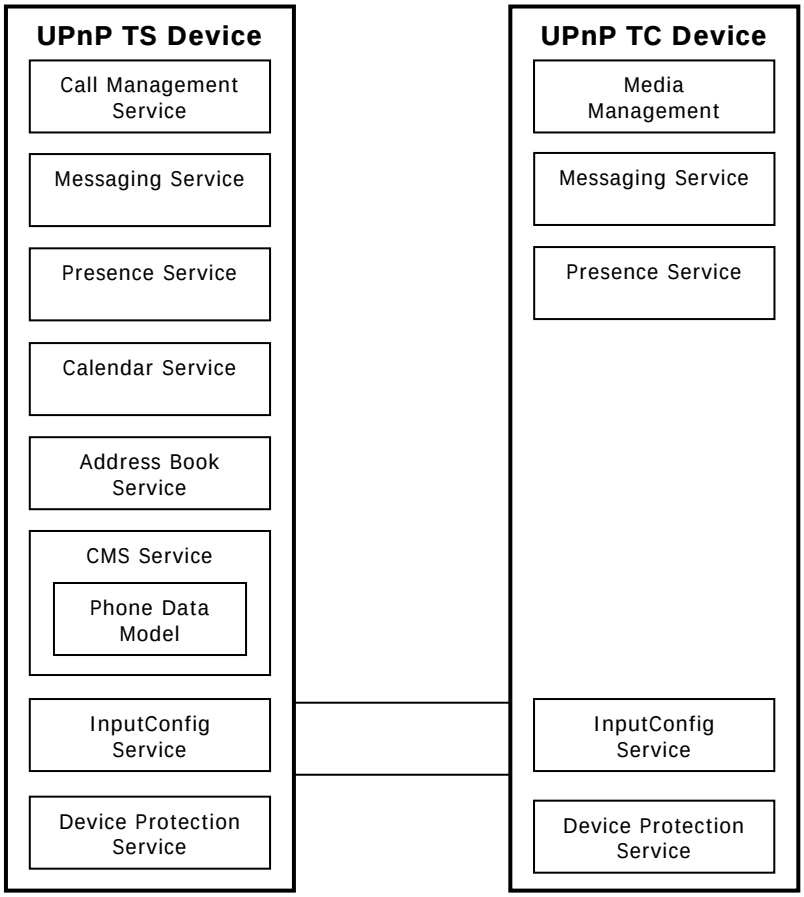

Figure 4 — UPnP Devices and Services for Telephony Architecture

The types of services a Telephony Server (TS) Device and a Telephony Client (TC) Device may include is shown in Figure 4.

- The Media Management Service resides in a Telephony Client (TC) device and is responsible to establish and manage media session on the client side.
- The Call Management service resides in the Telephony Server (TS) device and is responsible for establishing and real-time controlling call and media session on the server side.
- The Messaging service can reside in the Telephony Server (TS) device or the Telephony Client (TC) device.
- Phone management on the TS-side is performed via the reuse of the Configuration Management Service (CMS), as specified by UPnP Device Management, and a specific data model defined by UPnP Telephony.
- The InputConfig Service due to its symmetrical nature will reside in both Telephony Server (TS) Device and Telephony Client (TC) Device.
- Security is achieved by reusing on both TS and TC the DeviceProtection service, as specified by the Gayeway WC, with a ad hoc profiling for the Telephony WC.

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Figure 5 shows a deployment scenario where two Telephony Server devices are residing in a single physical box. This kind of deployment model will allow having multiple telephony identities in a single physical box with each identity representing a telephone number. A Telephony Server (TS) will advertise its identity in the device description document. Indeed these two TS devices could be embedded in a root UPnP Basic device as shown in the Figure 5. Figure 5 shows that the two UPnP TS devices are logical functions of a unique telephone.

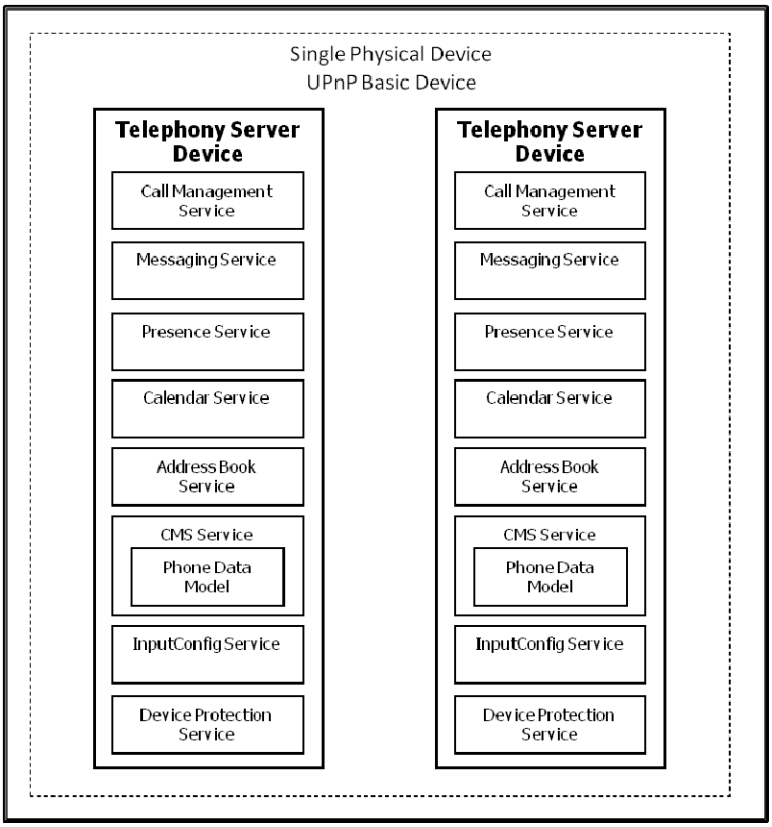

Figure 5 — A Deployment Scenario with Two Telephony Server Devices in a Single Physical Box

6.2.1 Call Management Service

The Call Management Service is responsible to enable the features for a Telephony Control Point (TelCP) to initiate a call, accept or connect an incoming call or receive notifications for incoming calls and manage media session associated with the call including starting and stoping the media session.. The high-level interaction between the Call Management Service in a Telephony Server (TS) and a Telephony Control Point (TelCP) is shown below. These interactions involve a number of interfaces exposed by the Call Mangement Service and the Telephony Control Point (TelCP) uses those interfaces to initiate a call or accept or reject or modify an incoming call. The Call Management service also includes interfaces to manage media session including starting and stoping of media transfer on the server side, and getting media capabilitities of the server. The interactions also involve eventing mechanism where notifications for incoming call are sent from the Telephony Server (TS) to the Telephony Control Point (TelCP) through the Call Management Service.

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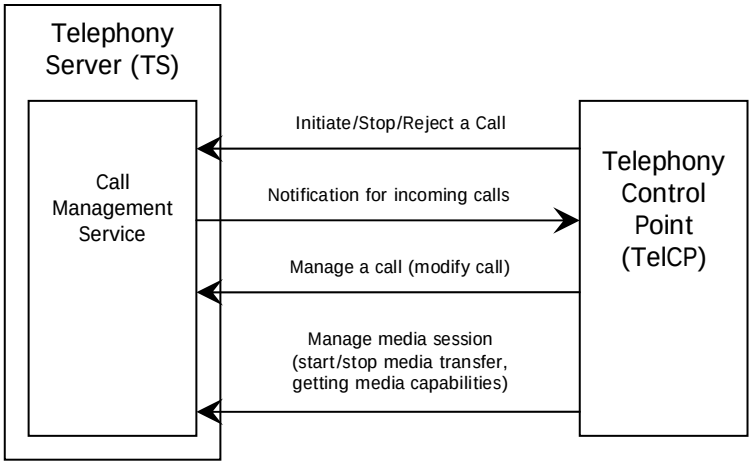

Figure 6 — Call Management Service

6.2.2 Media Management Service

The Media Management Service provides the feature to set-up media session on a Telephony Client (TC), under the control of a Telephony Control Point (TelCP). The architectural model shown in the diagram below at a very high level explains how media session parameters are gathered/negotiated by a Telephony Control Point (TelCP) to establish a media session between a Telephony Server (TS) and a Telephony Client (TC). The more details of the negotiations of media capabilities are explained in 6.2.3.

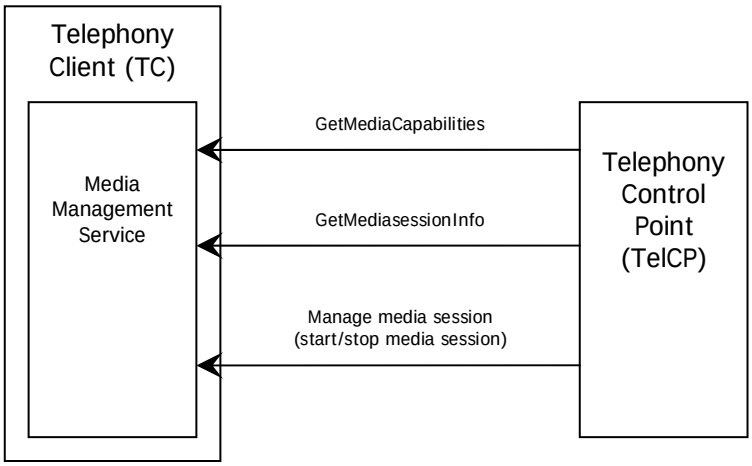

Figure 7 — Media Management Service

6.2.3 Interaction of Media and Call Management Service

The Telephony Server and the Telephony Client (TC) expose interface for a Telephony Control Point (TelCP) to retrieve the media capabilities of the server and the client. Once the media capabilities are gathered and matched by the Telephony Control Point (TelCP), the Telephony Control Point (TelCP) starts the media session by invoking actions exposed by the Telephony Server (TS) and the Telephony Client (TC).

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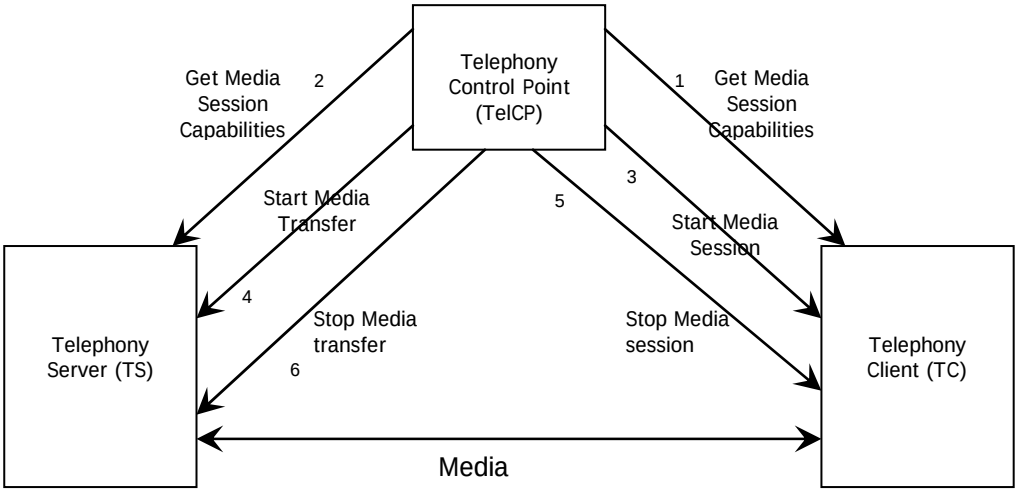

Figure 8 — Architecture for Media Management Service

Figure 8 describes the basic flow of the sequence to establish media session between a Telephony Server (TS) and a Telephony Client (TC). The diagram shows a 3-box scenario. However, the location of the control point can be anywhere including in the Telephony Server (TS) or the Telephony Client (TC). When the Telephony Control Point (TelCP) resides in the Telephony Server (TS) or in the Telephony Client (TC), the interaction between the server or the client where the control point resides will be through internal interface.

A Telephony Control Point (TelCP) can initiate the media session establishment process from either end (TS or TC). Figure 8 only shows one possible approach. The interactions between the TelCP and TS or the TC are through UPnP actions.

6.2.4 Messaging Service

The basic architecture for the messaging service can be envisioned as the interactions between a Telephony Server (TS), or a Telephony Client (TC), with a Telephony Control point (TelCP). Figure 9 shows the basic architecture for the Messaging service.

It is assumed that the end user functions for managing messages are provided by a user terminal implementing the TelCP.

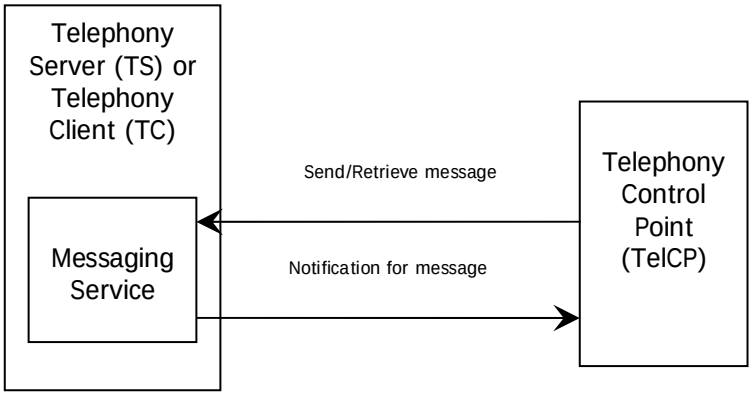

Figure 9 — Messaging Service Interaction Diagram

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The basic architecture for Messaging service requires basic UPnP eventing mechanism for notifications of incoming messages. The interactions between Telephony Control Point (TelCP) and the Messaging service also requires a number of UPnP actions to realize the features of messaging service.

6.2.5 Presence Service

This service provides the features for a TelCP to manage the presence information that a UPnP device, either a TS or a TC acting as UPnP server for presence management, exposes in the UPnP network, in order to:

- Retrieve and update the presence status managed by the Presence service, and representing the presence information for a user.
- Get notifications of presence updates.
- Retrieve the presence information of the remote contacts managed by the Presence service.
- Get notifications of presence updates of remote contacts.

The architecture for the Presence service is shown in Figure 10.

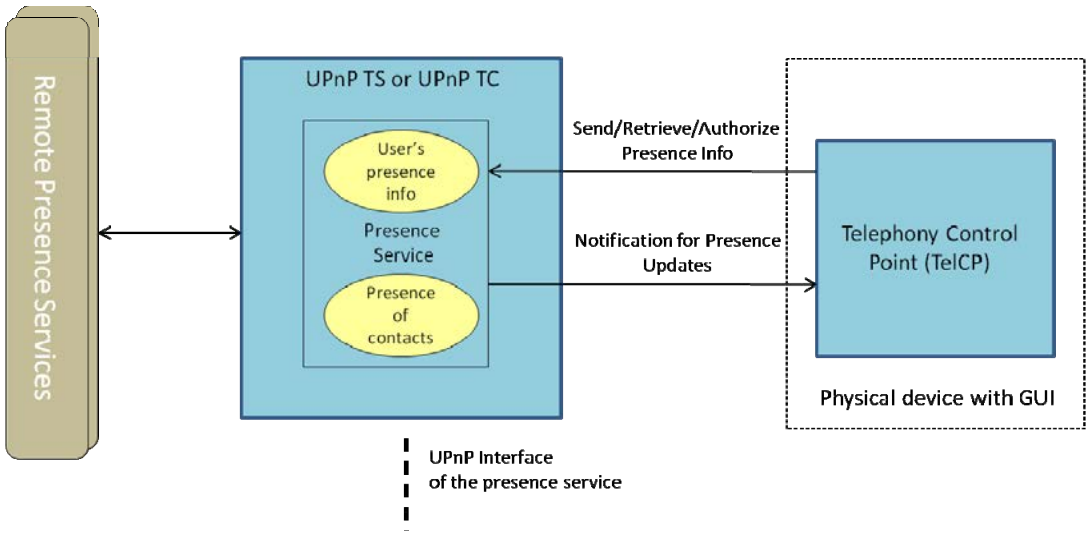

Figure 10 — Architecture for Presence Service

6.2.6 Calendar Service

The Calendar service provides in the UPnP network the overall set of calendar functionalities of a phone (Smart Phone, IP Phone, VoIP Gateways, etc), as a role of a TS. The Calendar service is included in the TS device. More than one Calendar service can coexist in the same UPnP network, it's up to the TelCP to manage multiple Calendar service.

The Calendar service provides a TelCP with the following features:

- Managing the family calendar: managing reminders/ToDo list/Alarms/General Notes.
- Family user can register for events when user is outside of the home via any messaging mechanism.
- Synching the events with the network calendar service if available.

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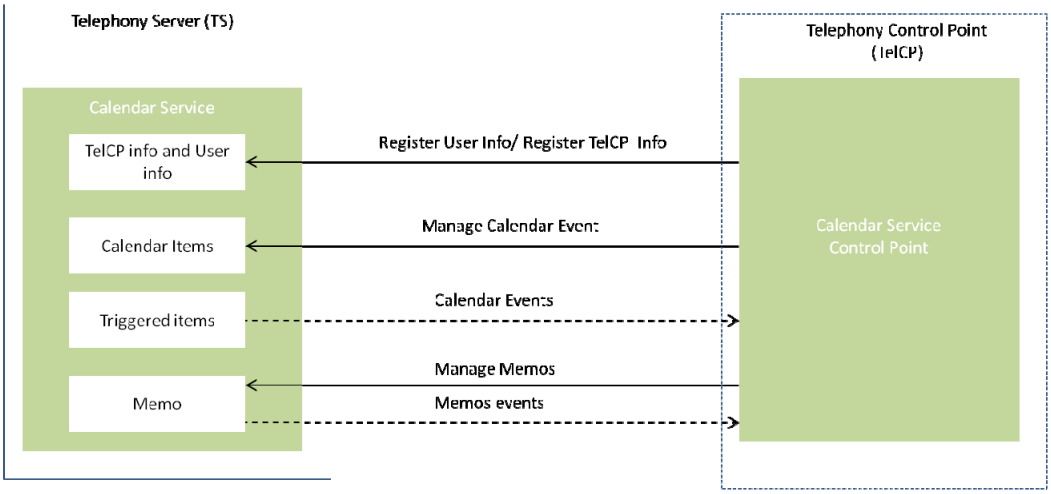

Figure 11 — Architecture for Calendar Service

6.2.7 Address Book Service

The AddressBook service is included in the TS device. More than one AddressBook service can coexist in the same UPnP network, it's up to the TelCP to manage multiple AddressBook service. The AddressBook service provides a TelCP with the following address book features:

- Managing network address book (fetching the contact information from the network address book, exporting the network address book contacts in the local address book).
- Contact share: sharing of full or part of contact information with other contacts.
- Managing Personal Contact Card (PCC): managing personal information (e.g. personal profile and contact information, sharing personal information with friends/contacts.
- Contact Invitation handling.

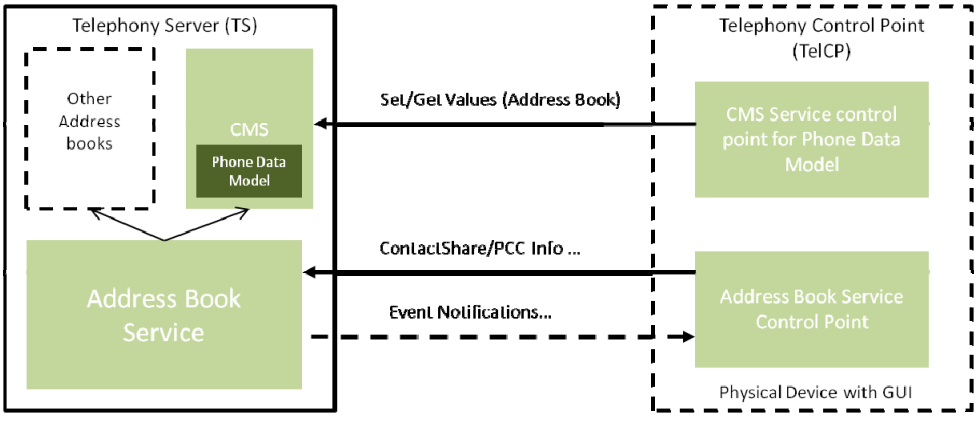

Figure 12 — Architecture for Address Book Service

6.2.8 Phone Management via Data Model

The basic software architecture for the support of functionalities for configuration management of the Telephony Server (TS), via a set of configuration parameters (i.e. the "Telephony Server Data Model"), is shown in the Figure 13.

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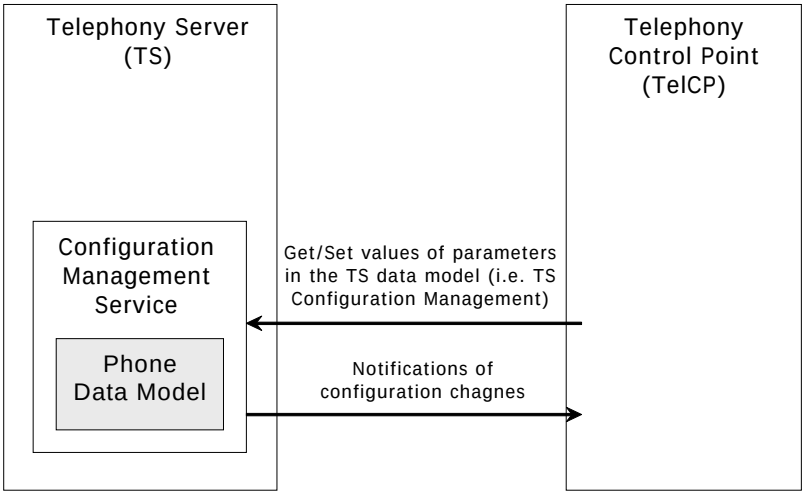

Figure 13 — Phone Management via Data Model Interaction Diagram

This architecture assumes that UPnP Device Management (DM) is reused as follows:

- A Telephony Server (TS) device may include a Configuration Management Service (CMS).
- The CMS service allows the manipulation of configuration parameters, both for retrieving configuration and status information from a managed device (here the TS device) or for changing its configuration; notifications of configuration updates are also available.
- The UPnP Telephony architecture assumes that a Data Model for the TS is defined, both including generic device parameters, as specified in UPnP DM CMS service, and specific additional parameters for managing the TS features (e.g. manipulating address book with contacts, accessing lists of calls, setting ringtones).

Finally, the Telephony Control Point (TelCP) will include also the capability of control point for UPnP DM.

6.2.9 InputConfig Service

The InputConfig Service (IS) provides a feature for user-friendly input capability setup via UPnP means. The sender and receiver devices shall have this service in order to facilitate such user friendly input capability. The architecture for the InputConfig Service (IS) is shown below.

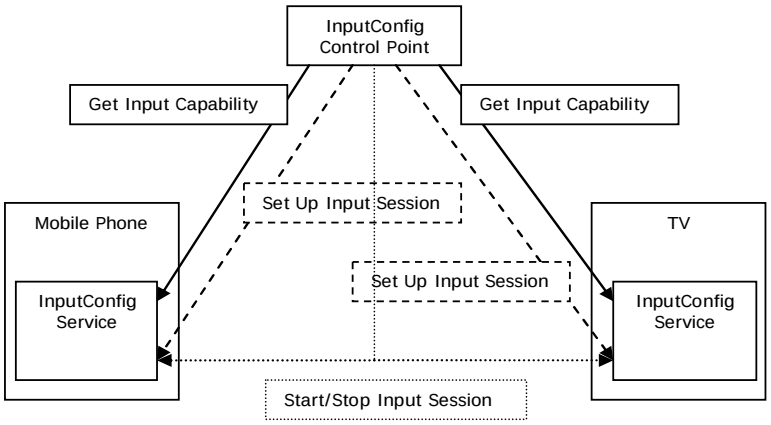

Figure 14 — Architecture for InputConfig Service (IS)

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The above architecture shows a 3-box model where a InputConfig Control Point (ICP) resides on a device other than the sender and receiving device with InputConfig Service (IS). However, the InputConfig Control Point (ICP) can reside in either of the devices due to the symmetrical nature of the service. The InputConfig Control Point (ICP) retrieves input capability information of the devices by invoking action exposed by the InputConfig Service (IS) and does the capability matching to select and setup the appropriate role for the devices (which include sender or receiving role, input type, etc) and the protocol for exchanging input data. The actual transfer of input data occurs in out of band mechanism (i.e. the protocols for exchanging input data are not based on the UPnP protocol stack, [1]).

6.2.10 Security

According to the specification of the security solution for UPnP IGD:2, the security solution for UPnP Telephony reuses the DeviceProtection service specified in IGD:2, as shown in Figure 15.

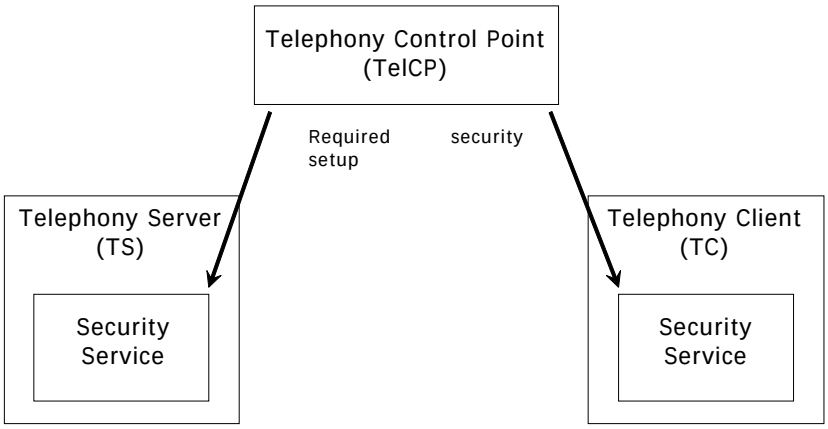

Figure 15 — Architecture for Security Service

Here, both the Telephony Server (TS) device and the Telephony Client (TC) device can include a security specific service (i.e. the DeviceProtection service), that allows a Telephony Control Point (TelCP) to setup the required security level when accessing each of two TS and TC devices defined by UPnP Telephony.

Indeed, the profiling of DeviceProtection service for UPnP Telephony includes the following specific details:

- the definition of specific “roles” for UPnP Telephony that can be assigned to Telephony Control Points (TelCP), for limiting the access to the UPnP Telephony services, in relation to available commands (actions on TS and TC) and resources (e.g. identities in the TS).
- how each UPnP Telephony service shall be access controlled on action level.

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Annex A
(informative)

Deployment Scenarios

A.1 Intended Deployment Scenarios

A.1.1 TV With a Telephony Control Point

Figure A.1 shows a model where a Telephony Control Point (TelCP) resides on a TV and the Telephony Server (TS) resides on a phone. This model can realize a number of use cases including presence of contacts, presence updated by the control point, initiating a call, notifications, etc. In case of presence of contacts, the Telephony Control Point (TelCP), that resides on the TV, can invoke an action to retrieve the presence information of the contact of interest and also the same applies while updating presence at the telephony Server (TS). The telephony Server (TS) can notify to the Telephony Control Point (TelCP) on the TV about any incoming call or a notify call-back. This is one of the very basic architectural models and, however, with this model it is not possible to establish a media session since there is no Telephony Client (TC) on the TV that can have a media session with the Telephony Server (TS) on the phone.

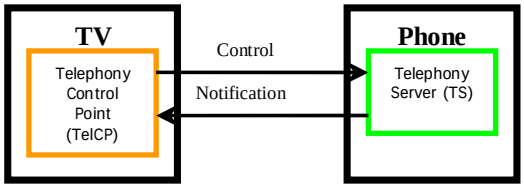

Figure A.1 — Architecture with Telephony Control Point on a TV

Figure A.2 shows another deployment model for the model described above. In the scenario below, the Telephony Server (TS) is communication with multiple Telephony Control Points (TelCP). Besides being controlled by multiple telephony Control Points (TelCP), possibly concurrently, it is basically the same model as described above.

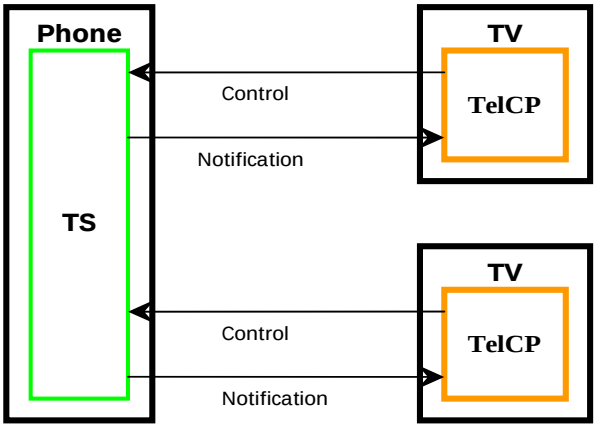

Figure A.2 — Deployment with a TelCP on a TC - Multiple TV Model

Another variation of the model “Telephony Control Point (TelCP) on a TV” is the case where the telephony Control point (TelCP) on the TV can control multiple telephony Servers (TS). This is shown in Figure A.3.

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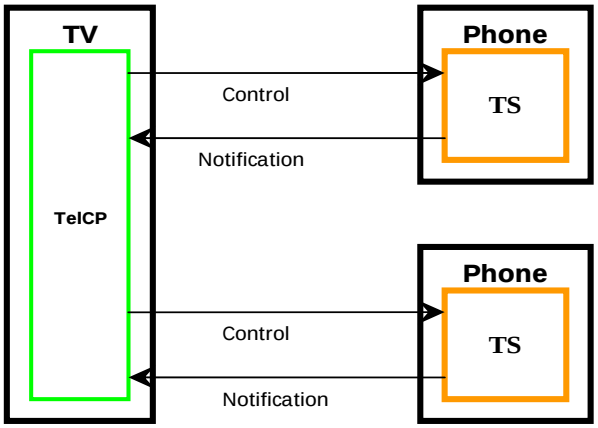

Figure A.3 — Deployment with a TelCP on a TV - Multiple Phone Model

A.1.2 TV With a Telephony Control point (TelCP) and a Telephony Client (TC)

Figure A.4 represents a 2-box model where the TV includes a Telephony Client (TC) and a Telephony Control Point (TelCP). The Telephony Server (TS) resides on the phone. The use cases that can be realized using this model includes call itself, which basically means establishing bi-directional media session between the Telephony Client (TC) and the Telephony Server (TS), messaging including both session and page mode, seamless handover, modifying stream on a call, etc..

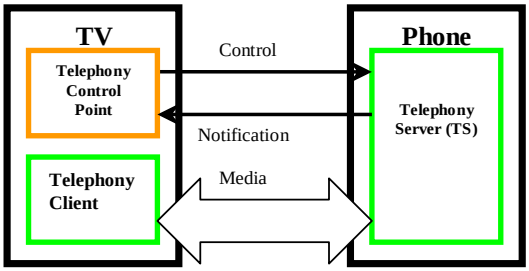

Figure A.4 — An Architecture with a Telephony Control Point (TelCP) and a Telephony Client (TC) on a TV (2-Box Model)

A variation of the above deployment model is shown in Figure A.5. Figure A.5 also shows multiple TV, each with a Telephony Control Point (TelCP) and a Telephony Client (TC), that are interacting with the Telephony Server (TS). This deployment mode is suitable to realize features such as calling using multiple devices, seamless hand-over, and modifying a stream in a call.

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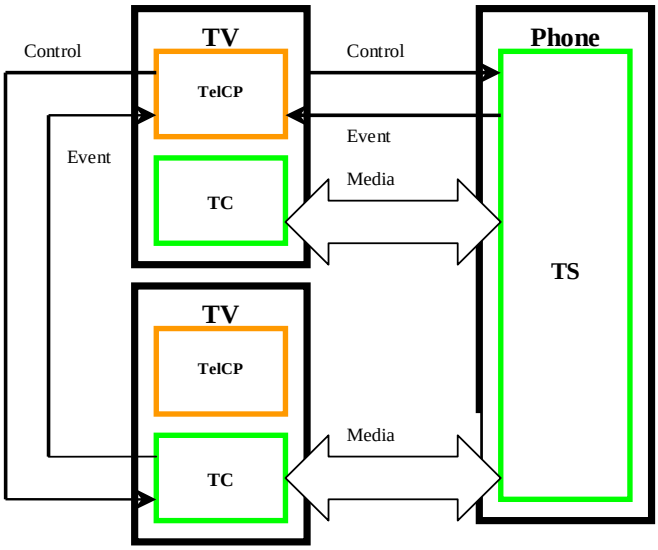

Figure A.5 — Deployment model with a Telephony Control Point (TelCP) and a Telephony Client (TC) on a TV (2-Box Model) – Multiple TV Model

A.1.3 Phone With a Telephony Control Point and Telephony Server

Figure A.6 shows a diagram where a Telephony Control Point (TelCP) and a Telephony Server (TS) reside on a phone and the Telephony Client (TC) resides on a TV. This is a 2-box physical model where the control point resides in the phone. This model can realize the feature such as call itself where a bi-directional media session is established between the Telephony Client (TC) and the Telephony Server (TS) and is controlled by the telephony Control Point (TelCP) residing in the Telephony Server (TS).

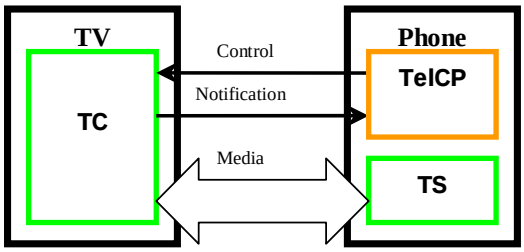

Figure A.6 — Deployment model with a Telephony Control Point (TelCP) and a Telephony Server (TS) on a Phone (2-Box Physical Model)

A variation of the above model, where multiple Telephony Clients (TC) are interacting with the Telephony Server (TS), is shown in Figure A.7. A number of features including seamless handover, modifying a stream in a call can be realized by this deployment model.

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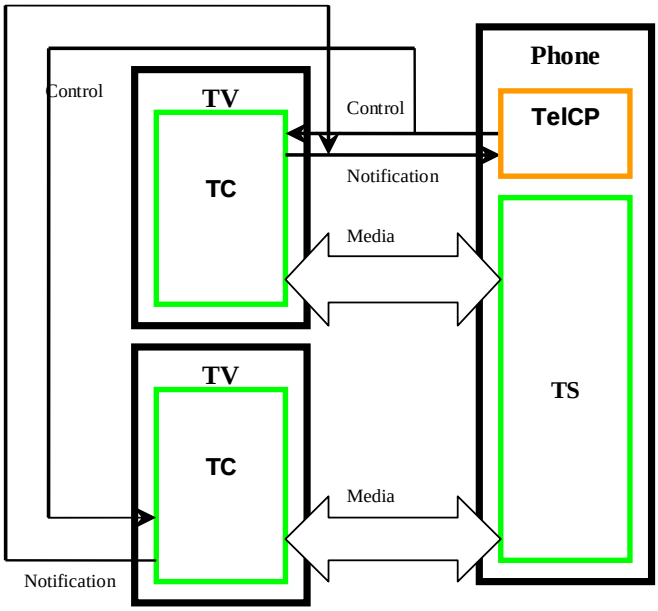

Figure A.7 — Deployment with a phone having a Telephony Server (TS) and a Telephony Control Point (TelCP) - Multiple TV Model

A.1.4 Phone With a Telephony Control Point

Figure A.8 shows a deployment model where a Telephony Control Point (TelCP) resides on a phone. This model can realize the feature such as presence updated automatically by the Telephony Client (TC).

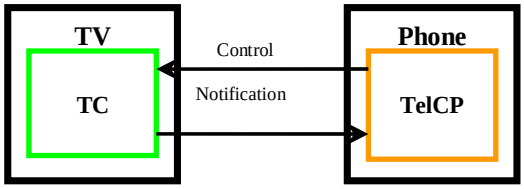

Figure A.8 — Deployment with a Telephony Control Point (TelCP) on a Phone

A derivative of the above deployment model is shown in Figure A.9 where multiple telephony Clients (TC) interact with the Telephony Control Point (TelCP) residing on the Phone.

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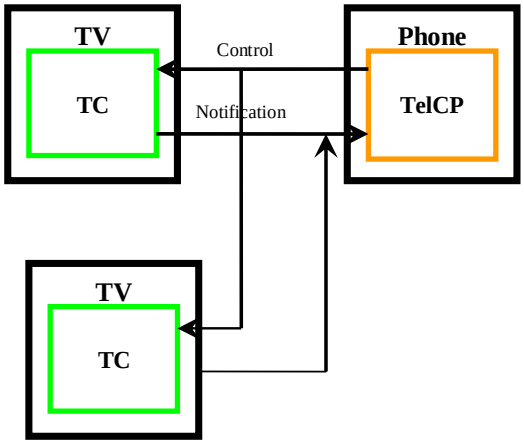

Figure A.9 — Deployment with a Telephony Control Point (TelCP) on a Phone – Multiple TV Model

A.1.5 A Telephony Control Point Outside of a Device with no Telephony Client and Server

This is the basic architectural model that has been described in clause 6 of this document. This model basically represents a 3-box model, where the Telephony Control Point (TelCP) resides on a box outside of the Telephony Server (TS) and the Telephony Client (TC). The Telephony Control Point (TelCP) discovers both the Telephony Client (TC) and the Telephony Server (TS) and can establish the media session between them and then can control the media session between the Telephony Client (TC) and the Telephony Server (TS).

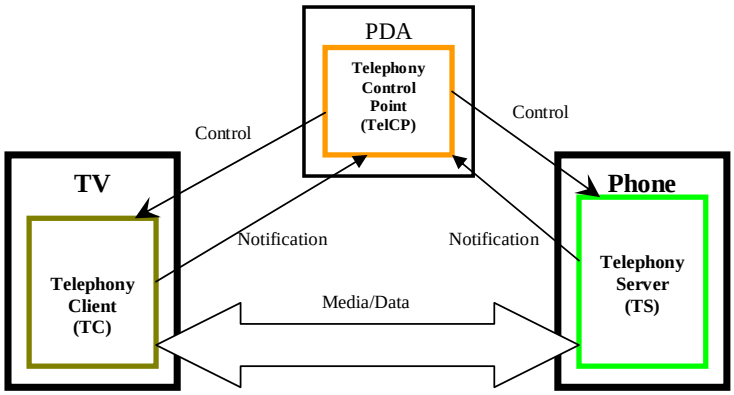

Figure A.10 — Deployment with an independent Telephony Control point (TelCP) -3 Box Scenario

A variation of the above deployment model is shown in Figure A.11 where multiple TVs with a Telephony Client (TC) establish media session with a Telephony Server (TS). The media sessions are controlled by a stand alone Telephony Control Point (TelCP). This variation of deployment can realize features such as calling using multiple devices, seamless hand-over, and modifying a stream in a call.

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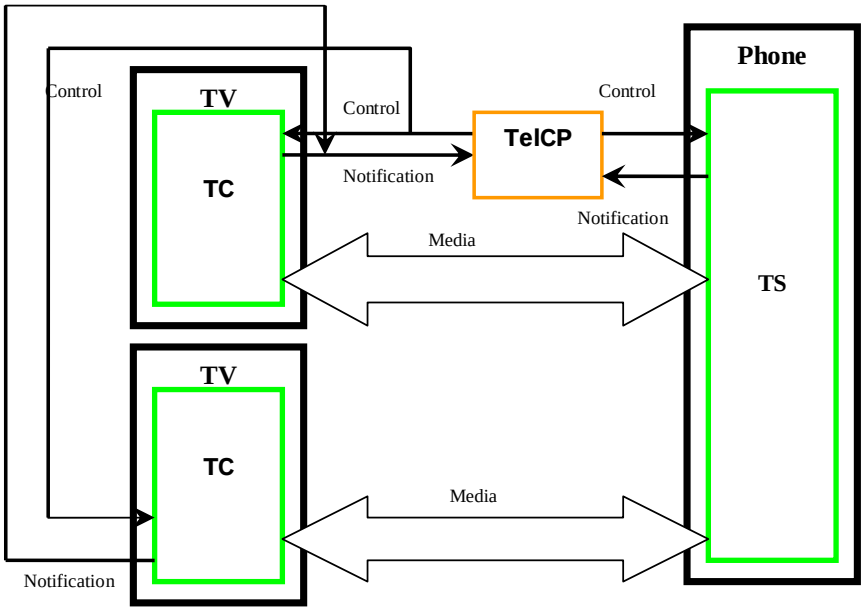

Figure A.11 — Deployment with an independent Telephony Control Point (TelCP) – 3-Box with Multiple TV Model

A.1.6 Messaging Service Deployment

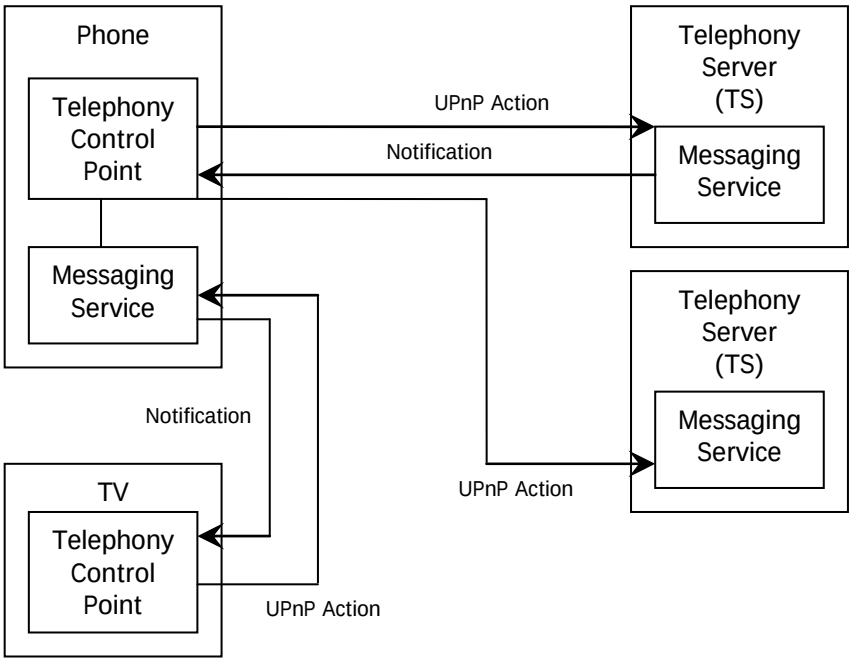

Figure A.12 — Messaging Service Deployment with Phone as the Messaging Aggregator

The above figure shows a deployment scenario where a phone acts as the aggregator of messaging service by gathering messages information from multiple Telephony Servers (TS).

A.1.7 Multiple Telephony Servers in a Telephone

A Home Gateway with VoIP functionalities (for communications, messaging, presence, ...), that provides multiple VoIP lines to other devices via UPnP Telephony, can implement

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multiple Telephony Servers (TS), as shown in the figure below (with a Voip Gateway and two lines).

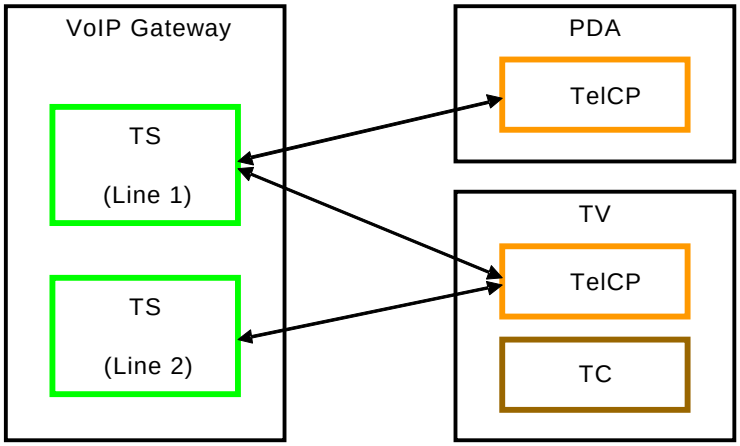

Figure A.13 — Multiple Telephony Servers in a telephone

Then, Telephony Control Points can enroll and use the features of the multiple Telephony Servers, in order to accommodate the end user preference: e.g. a PDA could subscribe to the VoIP gateway only for Line 1, while a TV could subscibe to both Lines.

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Annex B
(informative)

Bibliography

The following documents, in whole or in part, may be useful for understanding this document but they are not essential for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

[2] – UPnP Device Architecture, version 1.0., Annex A – IP Version 6 Support. Available at: http://www.upnp.org/resources/documents/AnnexA-IPv6_000.pdf.

[3] – UPnP-tech-NamingConventions-v2-20071010.pdf. Available at: https://members.upnp.org/default.asp?ItemType=Doc&ItemID=7005.

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