Converged Personal Network Service Requirements

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Open Mobile Alliance

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1. Scope (Informative)

This Requirement Document (RD) defines the requirements for the Converged Personal Network Service-CPNS 1.1 and deferred requirements that can be used as a base for future version of CPNS.

The CPNS Enabler enables CPNS entities in a personal network (PN) to consume services within that PN, services from and to other PNs, and services provided by service providers outside the PN.

2. References

2.1 Normative References

[RFC2119] "Key words for use in RFCs to Indicate Requirement Levels", S. Bradner, March 1997, URL:http://www.ietf.org/rfc/rfc2119.txt

2.2 Informative References

[3GPP TS 22.004] 3GPP TS 22.004 V8.0.0 (2006-12) "General on supplementary services (Release 8)"

[3GPP TS 22.004] "General on supplementary services" E.g. 3GPP TS 22.004 (Release 8) URL:http://www.3gpp.org/ftp/Specs/html-info/22004.htm

[3GPP TS 22.101] "Service aspects; Service principles" E.g. 3GPP TS 22.101 (Release 9) URL:http://www.3gpp.org/ftp/Specs/html-info/22101.htm

[3GPP TS 22.105] "Service aspects; Services and service capabilities" E.g. 3GPP TS 22.105 (Release 9) URL:http://www.3gpp.org/ftp/Specs/html-info/22105.htm

[3GPP TR 21.905] "Vocabulary for 3GPP Specifications" E.g. 3GPP TR 21.905 (Release 9) URL:http://www.3gpp.org/ftp/Specs/html-info/21905.htm

[3GPP TR 22.944] "Report on service requirements for UE functionality split". E.g. 3GPP TS 22.994 (Release 8) URL:http://www.3gpp.org/ftp/Specs/html-info/22004.htm

[3GPP TS 22.259] "Service requirements for Personal Network Management (PNM); Stage 1"

E.g. 3GPP TS 22.259 (Release 9) URL:http://www.3gpp.org/ftp/Specs/html-info/22259.htm

[3GPP TS 23.259] "Personal Network Management (PNM); Procedures and information flows"

E.g. 3GPP TS 23.259 (Release 9) URL:http://www.3gpp.org/ftp/Specs/html-info/23259.htm

[3GPP TS 24.259] Personal Network Management (PNM); Stage 3

E.g. 3GPP TS 24.259 (Release 8) URL:http://www.3gpp.org/ftp/Specs/html-info/24259.htm

[OMA – CPNS] Converged Personal Network Service (CPNS) 1.0 - 03 May 2011 URL:http://www.openmobilealliance.org/

[OMADICT] "Dictionary for OMA Specifications", Version 2.8, Open Mobile Alliance™, OMA-ORG-Dictionary-V2_8, URL:http://www.openmobilealliance.org/

[OMA – Presence] "Presence", Open Mobile Alliance™, OMA-TS-Presence_SIMPLE-V2_0-20081223-C URL:http://www.openmobilealliance.org/

[OMA – Privacy] "Privacy", Open Mobile Alliance™, OMA-RRP-Privacy-V1_0-20070807-A URL:http://www.openmobilealliance.org/

[TS 102 689] "Machine-to-Machine communications (M2M); M2M service requirements"

3. Terminology and Conventions

3.1 Conventions

The key words “MUST”, “MUST NOT”, “REQUIRED”, “SHALL”, “SHALL NOT”, “SHOULD”, “SHOULD NOT”, “RECOMMENDED”, “MAY”, and “OPTIONAL” in this document are to be interpreted as described in [RFC2119].

All sections and appendixes, except “Scope” and “Introduction”, are normative, unless they are explicitly indicated to be informative.

3.2 Definitions

CPNS Device	A Device [OMADICT] which embeds CPNS Entity(ies). CPNS Devices are assumed to have capabilities to process, store and/or render content, as well as to have communication interfaces that enable them to perform in different Modes in Personal Networks.
CPNS Server	A functional entity that provides resources to CPNS entities either in response to requests or in a Push mode. In addition, it interacts with other external entities, such as Content Provider Server etc., for the purpose of service provisioning.
CPNS User	The CPNS User is the person who uses CPNS Service using PNE(s)
External Entity	An entity that interacts with CPNS Entities, but is not specified by the CPNS Enabler specification
Interactive Service	Interactive Service is the Service in which the user continuously interacts by providing inputs in order to change the content in real time
Mode	There are three identified Modes for CPNS Devices: PN GW, PNE and BOTH. The Modes that CPNS Devices can operate in depend on their capabilities, user’s configuration, or Operator’s policies.
Non-CPNS Device	A Device [OMADICT] which does not embed CPNS Entity(ies). It has limited or no CPNS functionality and therefore it needs non-CPNS proxy function to enable CPNS Service on it (e.g., DLNA)
Overlay Network	A virtual network which is built on top of an existing underlying network. Nodes in an Overlay Network can reach each other through multiple physical or logical links in the underlying network.
Peer-to-Peer Network	A network of connected PNE(s) where: • The PNE(s) form an Overlay Network, and • The process of establishing and maintaining connectivity between PNE(s) is handled mainly by the PNE(s) themselves, and • The PNE(s) can both offer and receive Services.
Personal Network (PN)	A collection of devices available to a CPNS User to consume and produce Services. All devices within a PN can be linked to a PN GW. A PN is a non-static collection and will vary over time. A PN consists at a minimum of a device acting in PN GW mode and another device acting in PNE mode.
PN Admin (Administrator)	A PNE or PN GW which has authorities to manage Adminee’s information that belong to the same user
Personal Network Element (PNE)	A functional entity making up a Personal Network. It may be used either to consume or provide content and/or Services (simultaneously or separately).
Personal Network Gateway (PN GW)	A functional entity which by interconnecting entities that reside in personal networks and wide area networks, instantiates a converged network that provides CPNS services. A PN GW at the device level enables a PNE to connect to a CPNS Server as well as other PNE in a same or another PN. This implies using a global network, such as a mobile network. At the service level, the PN GW manages the service access to and from PNEs, and the communication of capabilities information and statistics to the CPNS Server.
PN Inventory	List of PN(s) and CPNS Entities on CPNS Device(s) belonging to a PN or multiple PNs
Service	See [OMA-DICT] A selection from the portfolio of offerings made available by a Service Provider.

Service Group	A set of PNEs and/or PNGW(s) that share the same service, data and applications between themselves and which can stretch over multiple Personal Networks
Zone	Specific geographic area
Zone based service	The certain CPNS service to be provided in a specific zone where the zone PN GW covers
Zone PN GW	The PN GW which provides a unique service/content in a zone

3.3 Abbreviations

AP	Access Point
CPNS	Converged Personal Network Service
DLNA	Digital Living Network Alliance
GPS	Global Positioning System
HD	High Definition
M2M	Machine-to-Machine
OMA	Open Mobile Alliance
PLMN	Public Land Mobile Network
PN	Personal Network
PNE	Personal Network Element
PN GW	Personal Network Gateway
TE	Terminal Equipment
UI	User Interface
PAN	Personal Area Network
WAN	Wide Area Network
WiBro	Wireless Broadband
WiFi	Wireless Fidelity (Wireless Access Network mechanism)

4. Introduction (Informative)

Users are increasingly connecting their devices to short-range Personal Networks (PNs) such as home networks, in-car networks and body area networks. Connecting these PNs to other networks can greatly extend the accessibility of the devices, or *Personal Network Elements* (PNE(s)), in the PNs, enabling a number of compelling Services, including access by PNE(s) to Services outside the PN (e.g. a Bluetooth-connected Personal Media Player (PMP) uses your cell phone's WAN connection to receive a video streamed from the Internet).

The goal of the OMA Converged Personal Network Services (CPNS) enabler is to provide application-layer support for ubiquitous access to Services in a *converged network*, which is a collection of individual networks that are interconnected by means of *PN Gateway* (PN GW) devices.

The CPNS Enabler facilitates access by devices in a PN to application or content Services that are available either locally in one or more other PNE(s), or residing in other networks, including other PNs or network elements accessed via a cellular or other WAN technology. The main objective of the enabler is to allow the PNE(s) that are part of the PN to access Services outside of the PN and for those PNE(s) to offer Services to PNE(s) in other networks. The CPNS Enabler provides a wide range of functionality to support converged-network Services, including (but not limited to) end-to-end management of Service sessions, Service publication and discovery, tailoring of Service characteristics based on PNE capabilities, remote management of PNE configuration data and firmware/software, collection of CPNS usage statistics, security and charging.

This enabler considers the interfaces and interactions between the key entities of the CPNS Enabler.

The main CPNS Enabler entities are:

- CPNS Server
- PN GW
- PNE

CPNS Server is an entity of CPNS Enabler that replies to requests from PN GW and ensures that the appropriate application is selected and appropriate content is provided to the PNE(s)

PN GW serves as an intermediary entity between the PNE(s) and other networks that forwards the requests from the PNE(s) to the other networks and the other way around

PNE(s) are connected to the PN GW and are used for rendering the content received from the PN GW or from each other. PNE(s) can also offer content and other Services to PNE(s) in the same PN and to entities in other networks.

Providing that the CPNS has great potential in many areas, such as home environment, Machine-to-Machine (M2M) communication, remote personal networks, etc., and given that not all of these capabilities were fully utilized and covered by CPNS v1.0, CPNS 1.1 defines additional features that were not specified in Release 1.0.

The new CPNS Release will extend the target usages, strengthen the interoperability, and overall improve the value of the specification altogether.

4.1 Version 1.0

This first version specifies the CPNS requirements and describes some Use Cases.

The CPNS Enabler facilitates access by PNE(s) to services/contents that are available either locally or residing in other networks, including those offered by other devices or network elements accessible via a cellular or other WAN technology.

This first version introduces the CPNS Enabler, specifies the definitions of each actor and specifies the main Requirements (High-Level Functional requirements, Security, Charging, Administration, Configuration, Usability, Interoperability and Privacy).

4.2 Version 1.1

CPNS 1.1 aims to specify requirements from the CPNS 1.0 that were not addressed and were deferred for the future release and to enhance the existing features and add new functionalities that are relevant for this release.

Enhancement of existing features and addition of new functionalities include the following:

- Strengthen the non-CPNS Proxy function
- To support non-CPNS Devices and gateways (ex.DLNA devices, legacy WiFi AP)Interaction with ETSI M2M
    - Functional mapping between CPNS and M2M
        - Mapping of ETSI M2M GW functionality onto CPNS PN GW
        - Mapping of CPNS interfaces onto ETSI M2M interfaces
- Device Categorization
    - To appropriately support various kinds of devices
- Enhancement of Personal Network / Service Group Management
    - Switching of PN GW and PNEs, Merging and splitting of Personal Networks
    - Enhancement of Service Group etc

5. CPNS 1.1 release description (Informative)

The CPNS Enabler provides a wide range of functionality to support converged-network Services, including (but not limited to) end-to-end management of Service sessions, Service publication and discovery, tailoring of Service characteristics based on PNE capabilities, remote management of PNE configuration data and firmware/software, collection of CPNS usage statistics, security and charging.

Main actors of CPNS are shown in the high diagram below.

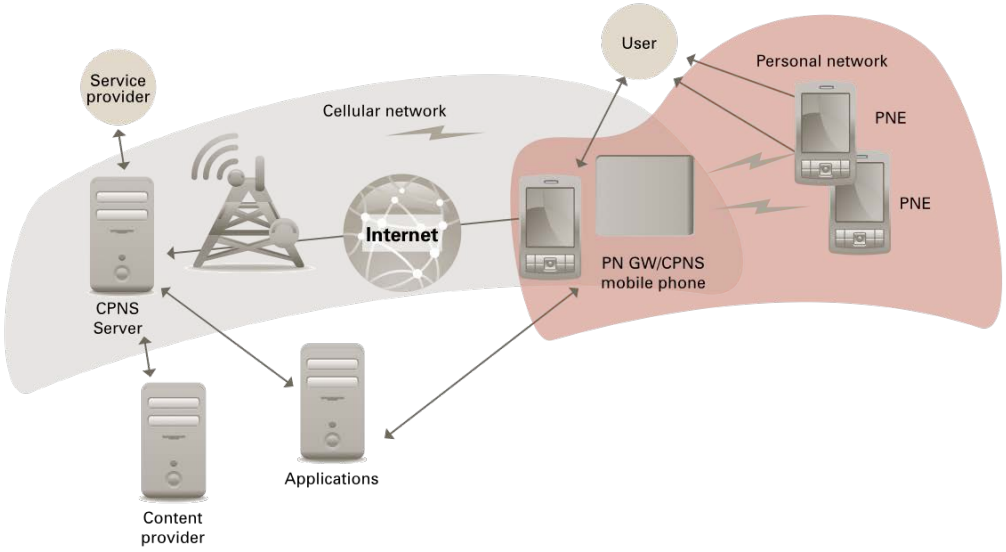

Figure 1 CPNS high level diagram

CPNS Server is an entity of CPNS Enabler that replies to requests from PN GW and external entities, such as Content Providers and ensures that the appropriate content is provided to the requesting PNE(s)

PN GW serves as an intermediary entity between the PNE(s) and other networks that forwards the requests from the PNE(s) to the other networks and the other way around. A PN GW can be a mobile phone with gateway capabilities

PNE(s) are logical entities that reside on end devices and are connected to the PN GW. PNE(S) are used for rendering the content received from the PN GW or from other PNE(s). PNE(s) can also offer content and other services to PNE(s) in the same PN and to entities in other networks.

5.1 End-to-end Service Description

CPNS has the potential to converge a large number of devices and services which enables them to work together anywhere at any time. This potential can be reached from cars to home appliances, Internet-based services to viral content distribution, interaction with M2M, expansion to non-CPNS devices etc.

CPNS provides a wide range of functionality to support converged-network services, including multimedia content delivery, end-to-end management of service sessions, publication and discovery of services, and customization of service characteristics based upon device capabilities. Specific added features to this Release are:

- Enhanced capabilities of non-CPNS Proxy to support non-CPNS Devices and gateways
- Interactivity with ETSI M2M
- Enhancement of Personal Network / Service Group Management
- Support for different devices with limited CPNS functionalities

Following use scenarios are possible with the help of CPNS enabler:

- An end user can watch high-quality movies on a big screen using a mobile device serving as a gateway between a movie-streaming server via Cellular network and home consumer electronic device via Wireless Personal Access Network technologies.
- The mobile phone or fixed gateway provides access to the global network for devices that only have local area connectivity (e.g. WiFi, Bluetooth).
- CPNS enables mobile phone connectivity to both a non-cellular navigation device and an MP3 player with wireless personal access, a user can simultaneously request relevant traffic updates and navigation information while downloading music files.
- An end user can access in-home appliances from outside the home using CPNS connections between personal networks and the CPNS Server. This allows remote control, monitoring and content delivery.
- An end user can also benefit from eHealth by using a PN GW, to communicate with health Sensors and pass the information to the CPNS server in the global network. This enables regular monitoring and simple daily care.

CPNS enables cooperation among service providers interested in home/personal/M2M network services and allows operators to differentiate services and prevent or minimize the customer churn.

6. Requirements (Normative)

6.1 High-Level Functional Requirements

Label	Description	Release
CPNS-HLF-001	The CPNS Enabler SHALL be able to assure that multiple delivery of services are supported by CPNS entities in parallel.	CPNS 1.0
CPNS-HLF-002	The CPNS Enabler SHALL enable the CPNS User to manage these different multiple services, i.e. to stop, start and switch between them.	CPNS 1.0
CPNS-HLF-003	The CPNS Enabler SHALL enable a CPNS entity to advertise the Services it offers, and discover and access the Services that are offered by other CPNS entities which belong to the same or different PNs.	CPNS 1.0
CPNS-HLF-004	The CPNS Enabler SHOULD allow CPNS Devices for changing Modes (e.g. in case that they are behaving as PNE(s) or PN GW) adaptively in terms of performing functions for the efficient use of device resources. Informational Note: In the context of this requirement, a CPNS Device is considered capable of changing Modes.	CPNS 1.1
CPNS-HLF-005	It SHOULD be possible for the CPNS Enabler to be informed about the current operational Mode of the CPNS Devices (e.g. behavior as PNE or PN GW) so that the network resources can be utilized more efficiently.	CPNS 1.0
CPNS-HLF-006	The CPNS Enabler SHALL support the functionality for managing the Service history of the PNE(s) (e.g. used for charging, resuming, and gathering statistics of Services).	CPNS 1.0
CPNS-HLF-007	The CPNS Enabler SHALL find out the device capabilities of the PN GW(s) and PNE(s).	CPNS 1.0
CPNS-HLF-008	The CPNS Enabler SHALL be able to provision the PN GW and the PNE(s).	Future Release
CPNS-HLF-009	The CPNS Enabler SHALL be able to request application, content and Services from the content provider or Service provider based on capabilities of PN GWs and PNE(s).	CPNS 1.0
CPNS-HLF-010	The CPNS Enabler SHALL be able to specify the destination of Services when using CPNS Service (e.g., requesting, transmitting).	CPNS 1.0
CPNS-HLF-011	The CPNS Enabler SHALL be able to create a Service Group for the PNE(s).	CPNS 1.0
CPNS-HLF-012	The CPNS Enabler SHALL be able to invite the PNE(s) for a Service Group.	CPNS 1.0
CPNS-HLF-013	The CPNS Enabler SHALL enable PNE(s) to provide data during the Interactive Service.	Future Release
CPNS-HLF-014	The CPNS Enabler SHALL support aggregation and distribution of message(s) for multiple PNE(s).	CPNS 1.0
CPNS-HLF-015	The CPNS Enabler MAY use the work of other standards organisations when relevant for CPNS, as appropriate.	CPNS 1.0
CPNS-HLF-016	The CPNS Enabler SHALL support the PN to make its status (including willingness, reachability etc) available to other interested CPNS entities.	CPNS 1.0
CPNS-HLF-017	The CPNS Enabler SHOULD have the ability to utilize the capabilities of a Presence Enabler for status information (including willingness, reachability etc).	Future Release
CPNS-HLF-018	The CPNS Enabler SHOULD support subscription to the status (including willingness, reachability, etc) of other users' PNs and be notified about status changes of those PNs.	CPNS 1.0
CPNS-HLF-019	The CPNS Enabler SHALL be able to support simultaneous delivery to different PNEs	CPNS 1.0

CPNS-HLF-020	CPNS Enabler SHALL enable seamless switching between available PNE(s) belonging to the same CPNS User while providing or consuming Services. The switching can be triggered by events like (not limited to) battery exhaustion, user preferences, etc.	CPNS 1.1
CPNS-HLF-021	CPNS Enabler SHALL enable seamless switching of PN-GWs belonging to the same PN providing that the target device supports PN GW capabilities. The switching can be triggered by events like (not limited to) battery exhaustion, user preferences etc.	CPNS 1.1
CPNS-HLF-022	The CPNS Enabler SHALL support deployment of applications relevant to CPNS.	CPNS 1.0
CPNS-HLF-023	The CPNS Enabler SHALL support the registration of PN and devices and Services in the PN.	CPNS 1.0
CPNS- HLF-024	The CPNS Enabler SHALL support storing and maintaining the information of Services and PN Inventory.	CPNS 1.0
CPNS- HLF-025	The CPNS Enabler SHALL support delivery of the information of devices and PN Inventory, when requested.	CPNS 1.0
CPNS- HLF-026	The CPNS Enabler SHALL support the zone based Service.	CPNS 1.0
CPNS- HLF-027	The CPNS Enabler SHALL support the periodic search to discover the PNE(s) in a zone if the CPNS User has opted in to be discovered by Zone PN GW.	CPNS 1.0
CPNS- HLF-028	The CPNS Enabler SHALL enable the zone PN GW to advertise its existence and Service to PNE(s), when entering the zone.	CPNS 1.0
CPNS- HLF-029	The CPNS Enabler SHALL enable to provide Service(s) through the zone PN GW without request from the PNE.	CPNS 1.0
CPNS- HLF-030	The CPNS Enabler SHALL provide mechanisms to share Services, data and applications only among members of the Service Group.	CPNS 1.0
CPNS- HLF-031	The CPNS Enabler SHALL be able to remove a PNE from a Service Group.	CPNS 1.0
CPNS- HLF-032	The CPNS Enabler SHALL be able to remove a Service Group.	CPNS 1.0
CPNS-HLF-033	The CPNS Enabler SHALL be able to support forwarding of content from one PNE to another or to multiple PNE(s).	CPNS 1.0
CPNS-HLF-034	The CPNS Enabler SHALL support device management functionalities for PNE and PN GW by interacting with device management server, in collaboration with CPNS Server.	Future Release
CPNS-HLF-035	The device management for PNE(s) SHALL be performed through PN GW.	Future Release
CPNS-HLF-036	The CPNS Enabler SHALL be able to identify CPNS entities, PN(s) and Service Group(s).	CPNS 1.0
CPNS-HLF-037	The CPNS Enabler SHOULD support delivery of copyright-protected contents to PNE(s).	CPNS 1.0
CPNS-HLF-038	The CPNS Enabler SHALL provide data to the specified PNE(s) in the same Service Group.	CPNS 1.0
CPNS-HLF-039	The CPNS Enabler SHALL support merging of PNs belonging to the same User without the suspension of on-going service(s), except in the case when PNs belong to different Service Groups.	CPNS 1.1
CPNS-HLF-039a	The CPNS Enabler SHALL support splitting of a PN without the suspension of on-going service(s).	CPNS 1.1
CPNS-HLF-040	The CPNS Enabler SHALL provide the means for creating a Service Group comprising PNEs with different device capabilities.	CPNS 1.1
CPNS-HLF-040a	The CPNS Enabler SHOULD support PNEs belonging to the same PN to combine their capabilities to act as one PNE within a Service Group	Future Release
CPNS-HLF-041	The CPNS enabler SHALL support the proxy functionalities in the PN GW, to provide CPNS services to non-CPNS devices (e.g. DLNA).	Future Release

CPNS-HLF-042	The CPNS enabler SHALL make use of CPNS functionalities in facilitating CPNS services with a non-CPNS device, if those CPNS functionalities are implemented in that target non-CPNS device. (In this case, the non-CPNS device has only limited number of CPNS functionalities)	Future Release
CPNS-HLF-043	The CPNS Enabler SHALL support at least one transport protocol for delivery of CPNS messages.	CPNS 1.1
CPNS-HLF-044	If the CPNS Enabler support SMS protocol, the CPNS Enabler SHALL support extraction of CPNS messages from received SMS structure and perform adaptation of those messages required by the underlying PAN technology (e.g. Bluetooth, WiFi and etc).	Future Release
CPNS-HLF-045	If HTTP protocol is supported, the CPNS Enabler SHALL support the adaptation in the PN GW that may be required depending on the underlying transport technology.	CPNS 1.1
CPNS-HLF-046	The CPNS Enabler SHOULD be able to interact with ETSI M2M and its necessary functions for delivery of different content, e.g. content between connected consumer electronics and eHealth data	Future Release
CPNS-HLF-047	The CPNS Enabler SHOULD enable the User to select PN Admin within a PN.	CPNS 1.1
CPNS-HLF-049	The CPNS enabler SHALL be able to provide CPNS services via non-CPNS Gateway (e.g. WiFi AP, Bluetooth AP, Legacy GW, etc.), with the help of proxy functionalities in the CPNS Entity	Future Release
CPNS-HLF-050	The CPNS enabler SHALL provide means to establish a temporal PN consisting of PN GW and PNE(s), which belong to the different users respectively, on the condition that those users are all agreed and the level of security is allowable	Future Release
CPNS-HLF-051	The CPNS Enabler SHALL provide security mechanisms which support additional features in CPNS 1.1, if required	CPNS 1.1
CPNS-HLF-052	The CPNS Enabler SHALL enable the Proxy functionality on the PN GW to authenticate non-CPNS devices	Future Release
CPNS-HLF-053	The CPNS Enabler SHOULD support a mechanism to establish a PN using the available information of PNs which belong to the same user (e.g. existing sustained PN information, PN usage information, pre-configured PN information)	CPNS 1.1

Table 1: High-Level Functional Requirements

6.1.1 Security

Label	Description	Release
CPNS-SEC-001	The CPNS Enabler SHALL support secure delivery of application and/or content Service data to the PNE(s).	CPNS 1.0
CPNS-SEC-002	The CPNS Enabler SHALL support various security mechanisms for each PNE and for each Service.	CPNS 1.0
CPNS-SEC-003	The CPNS Enabler SHALL be able to use keys needed to support confidentiality, integrity protection, and authenticity.	CPNS 1.0
CPNS-SEC-004	The CPNS Enabler SHALL support Secure Storage for storing security-related data (e.g., EUKey, Group Key)	Future Release
CPNS-SEC-005	The CPNS Enabler SHOULD provide simplified Group Key management compared with CPNS 1.0 while keeping backward compatibility with CPNS 1.0.	CPNS 1.1

Table 2: High-Level Functional Requirements – Security Items

6.1.1.1 Authentication

Label	Description	Release
CPNS-AUC-001	The CPNS Enabler MUST be able to support the authentication of CPNS Users, CPNS entities and/or External Entities which request access to CPNS related information and/or Services.	CPNS 1.0
CPNS-AUC-002	The CPNS Enabler MAY support validation of certificates for certain use cases, such as the attestation of personal user information.	Future Release

Table 3: High-Level Functional Requirements – Authentication Items

6.1.1.2 Authorization

Label	Description	Release
CPNS-AUZ-001	The CPNS enabler SHALL be able to authorize the CPNS Users and CPNS Entities, e.g. PN GWs, PNEs etc, when requesting access to CPNS services.	CPNS 1.0
CPNS-AUZ-002	The CPNS enabler SHALL be able to authorize the CPNS Users and CPNS Entities, e.g. PN GWs, PNEs etc, when requesting access to CPNS services	CPNS 1.0

Table 4: High-Level Functional Requirements – Authorization Items

6.1.1.3 Data Integrity

Label	Description	Release
CPNS-DIT-001	The CPNS Enabler SHALL support integrity of data.	CPNS 1.0
CPNS-DIT-002	The CPNS Enabler SHALL support data integrity in protecting against accidental or intentional changes to CPNS-related data transmission, by ensuring that changes to the data are detectable.	CPNS 1.0

Table 5: High-Level Functional Requirements – Data Integrity Items

6.1.1.4 Confidentiality

Label	Description	Release
CPNS-CON-001	The CPNS Enabler SHALL support encryption of messages.	CPNS 1.0
CPNS-CON-002	The CPNS Enabler SHALL support decryption of messages.	CPNS 1.0
CPNS-CON-003	The CPNS Enabler SHALL support data confidentiality that ensures transmitted information is not made available to unauthorised individuals or entities.	CPNS 1.0

Table 6: High-Level Functional Requirements – Confidentiality Items

6.1.2 Charging Events

Label	Description	Release
CPNS-CHG-001	The CPNS Enabler SHALL support means to charge differently for Service usage (within the same Service Group or individually; this also applies for simultaneous Service delivery), based on, for example, user identity, the users Service subscriptions, device type or capability, provided Service quality, and the type of the consumed Services; and for acting in different roles, such as PN GW or PNE.	Future Release
CPNS-CHG-002	The charging SHALL be able to use standardized mechanisms.	Future Release
CPNS-CHG-003	The CPNS Enabler SHALL enable the charging for delivery of information to third parties.	Future Release

Table 7: High-Level Functional Requirements – Charging Events Items

6.1.3 Administration and Configuration

Label	Description	Release
CPNS- ADM-001	The CPNS Users SHALL have the possibility of multiple subscriptions with different Service providers. For example, a CPNS User may own a mobile phone subscription with Service provider A, while the in-car communication unit has been supplied as part of an agreement of the car manufacturer with operator B, and the family's broadband access Services are delivered by operator C.	Future Release
CPNS-ADM-002	The CPNS Enabler SHALL be able to respond to queries for information about capabilities and usage statistics of PN(s) and PNE(s) from a Content Provider.	CPNS 1.0
CPNS-ADM-003	The CPNS Enabler SHOULD support collection of usage data from the CPNS Users and specific devices for the purpose of creating statistics.	CPNS 1.0
CPNS-ADM-004	The matching of PNE and PN capabilities and required capabilities MAY be automated, to facilitate the delivery of Services.	Future Release

Table 8: High-Level Functional Requirements – Administration and Configuration Items

6.1.4 Usability

Label	Description	Release
CPNS- QoS-001	The CPNS Enabler SHOULD provide mechanisms to ensure that the quality of the user experience is maintained.	Future Release

Table 9: High-Level Functional Requirements – Usability Items

6.1.5 Interoperability

Label	Description	Release
CPNS- INT-001	The CPNS Enabler SHALL allow CPNS Users to access any suitable Service (i.e. user-managed or operator-managed Services as well as 3rd party Services) on any suitable device (i.e. a device matching the capabilities required to consume the Service) and within any network island (e.g. home, car, hotspot, hotel, friend's place or office).	CPNS 1.0
CPNS- INT-002	The CPNS Enabler SHALL be able to interoperate with consumer electronics devices, which are using well-established and widely deployed standards other than those specified in the CPNS Enabler for device discovery, device profile, and multimedia Service delivery; and deliver multimedia Services to and from them. **Informational Note**: This requirement will be further detailed as the interoperability functionality is defined during the technical specification phase.	CPNS 1.0

Table 10: High-Level Functional Requirements – Interoperability Items

6.1.6 Privacy

Label	Description	Release
CPNS-PRIV-001	The CPNS Enabler SHALL ensure user privacy.	CPNS 1.0
CPNS-PRIV-002	The privacy requirements in [OMA-Privacy] SHALL be applied to the CPNS Enabler.	CPNS 1.0
CPNS-PRIV-003	The CPNS User SHALL be able to configure privacy policies for the management of data pertaining to user's Personal Network.	CPNS 1.0
CPNS-PRIV-004	The CPNS Enabler SHALL support the CPNS Users to verify whether they accept the collection of their usage data.	CPNS 1.0
CPNS-PRIV-005	The CPNS Enabler SHALL support the CPNS Users to cancel the collection of their usage data.	CPNS 1.0
CPNS-PRIV-006	The CPNS Enabler SHALL be able to protect personal user information when transmitting and performing a test on it.	CPNS 1.0

Table 11: High-Level Functional Requirements – Privacy Items

6.2 Overall System Requirements

Label	Description	Release
CPNS-SYS-001	It SHALL be possible for CPNS Enabler to be deployed in Peer-to-Peer Networks.	Future Release
CPNS-SYS-002	The CPNS Enabler SHOULD support aggregation and reporting of the CPNS Users' usage data into anonymized usage statistics at predefined intervals and/or asynchronously.	Future Release
CPNS-SYS-003	The CPNS Enabler SHALL support reporting of statistics to authorized receiving parties only.	Future Release

Table 12: High-Level System Requirements

Appendix A. Change History (Informative)

A.1 Approved Version History

Reference	Date	Description
OMA-RD-CPNS-V1_1-20160209-A	09 Feb 2016	Status changed to Approved by TP TP Ref # OMA-TP-2016-0033-INP_CPNS_V1_1_ERP_for_final_Approval

Appendix B. Use Cases (Informative)

B.1 Seamless Switching

B.1.1 Short Description

This use case demonstrates the ability to seamlessly switch the PN GW without terminating existing Service Group. It is assumed that all the devices are belonging to the same Service Group.

B.1.2 Normal Flow

1. A CPNS User, John, owns a number of devices such as a mobile phone, television, camera and an IP-enabled set-top box which contains PN GW capability. John requests to create a PN and Service Group with his devices using his mobile phone as a PN GW device.
2. While John is enjoying a music service, the battery exhaustion is detected and John is informed that the service will eventually shut down because of battery capacity exhaustion.
3. To receive the music service without interruption, John decides to transfer mobile phone's PN GW role to the set-top box by sending transfer request message to the set-top box via his mobile phone.
4. Upon receiving the request, the set-top box changes its mode to take over PN GW role.
5. After the transfer, John's set-top box sends response message to the mobile phone.
6. After receiving the response from the set-top box, John's mobile phone stops PN GW role.
7. John enjoys music service continuously without additional Personal Network and Service Group establishment procedure.

B.1.3 Market benefits

- The CPNS User can provide or receive a service without additional setup procedure
- The operator can improve the quality/quantity of service
- The vendor can increase the volume of sales taking in the CPNS functionalities which can add new features

B.1.4 Actors

- CPNS User
- CPNS Service Provider/Mobile Operator
- CPNS Device
- PN GW Device
- CPNS Server

B.2 Merging and Splitting of PN(s)

B.2.1 Short description

CPNS User may have more than one PN at the same time (e.g. one in the user's home and another in the user's personal area). CPNS User may want to merge them into one PN to get better user experience (e.g. larger screen or more bandwidth) or split one PN up to many PNs to enjoy the service without any break (e.g. keep downloading content when go outside.). This use case demonstrates how to merge & split these PNs.

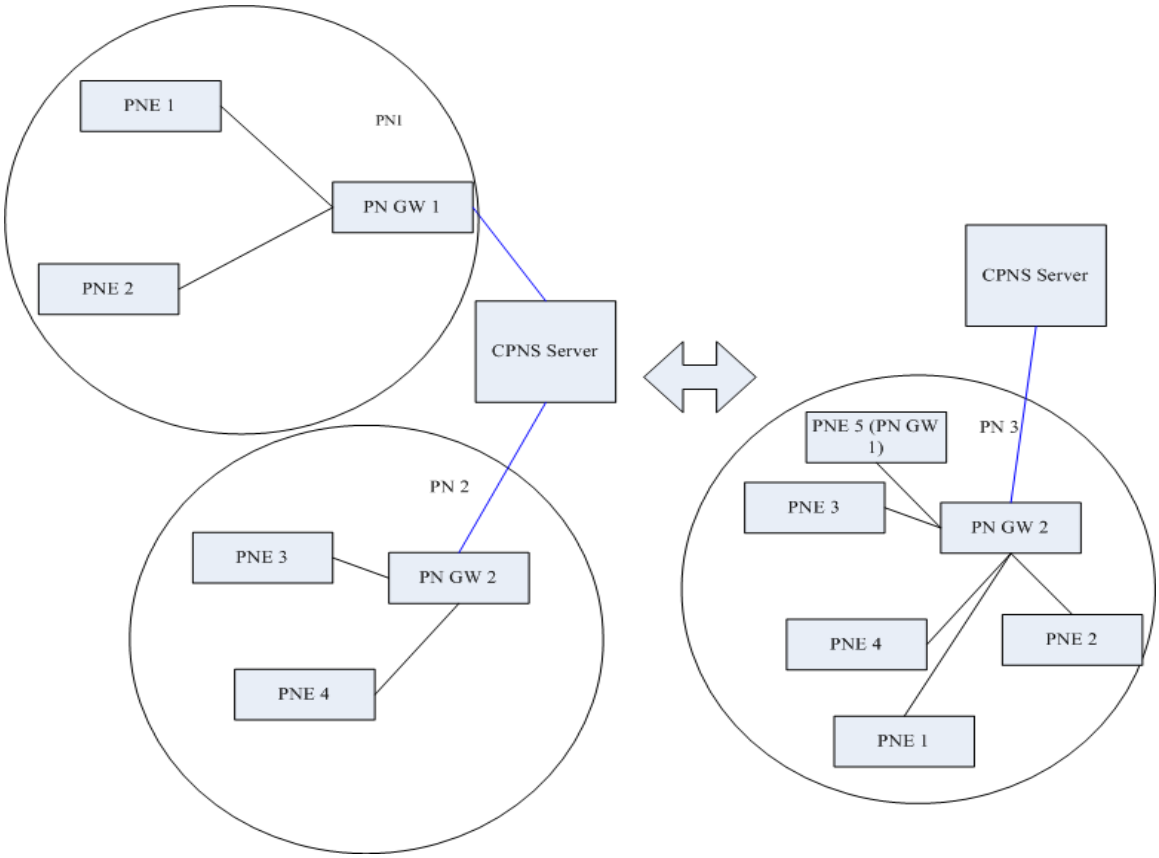

Figure 2 Merging and Splitting of PNs

B.2.2 Normal Flow

1. Bob has 2 PNs, one is in his home (PN 2 in the Figure 2), another is in his personal area (PN 1 in the Figure 2).
2. When Bob comes back home, he wants to merge them into one PN, so PN 1 & PN 2 are merged into PN 3 (right side in the Figure 2).
3. After dinner, Bob wants to go outside for a while, and he wants to keep PN 1 with him, so PN 3 is split up to PN 1 & PN 2.

B.2.3 Market benefits

- The CPNS User can access/enjoy CPNS services at any time & in everywhere.
- The operator can improve the quality of service and also Expand service areas from cellular networks to various local networks (e.g. Home networks, Office networks).
- The vendor can increase the volume of sales.
- The content/service provider can improve the quality and quantity of services.

B.2.4 Actors

- CPNS User
- PNE
- PN GW
- CPNS Server

B.3 Extended Service Group

B.3.1 Short Description

As CPNS User owns a number of devices such as a mobile phone, television, camera and an IP-enabled set-top box which are consist of different capability information of device, this use case demonstrates the ability to consist and maintain the Service Group based on device capability of personal devices so that services/contents can be delivered based on conceivable combination of those device capabilities in the same Service Group.

Note: The example of H/W device capabilities could be touch panel, display/screen, GPS, mike, speaker, communication chipset and etc, while the S/W device capabilities could be SNS app, photo shop, codec, video call and etc.

For instance, the User should be able to create a Service Group consisting of his mobile phone, TV and camera in order to make HD video calling available (Camera as a HD webcam to handle the video encoding and processing onboard, TV as a main display and mobile phone as a PN GW) or to play dual screen TV game (Mobile phone as a remote control and a subsidiary display to show bird's eye view of the immediate vicinity, TV as a main display to show the circuit track)

B.3.2 Normal Flow

1. John requests to create a PN with device capability information of his TV, mobile phone and camera using his mobile phone as a PNGW device.
2. After PN establishment, CPNS Server sends available Service Description based on conceivable combination of device capability information to John's PNEs.
3. Among received Service Profile, John decides to use HD video calling Service.
4. John requests to create Service Group which is consist of camera and TV device capability information to the CPNS Server. For instance, Service Group can consist of camera for motion detection and record, and TV for displaying HD images on its screen.
5. After receiving the Service Group creation response from the CPNS Server, John invites the Paul to the Service Group for HD video calls
6. John sends messages to invite the Paul's HD video calls device via his mobile phone or TV
7. Paul executes the same HD video call connecting to the PN GW using WPAN techniques.

B.3.3 Market benefits

- The CPNS User can extend the kind of services to enjoy by connecting a device to other devices which contains different functionalities.
- The operator can improve the quality/quantity of service as well as increase the revenue from data services.
- The vendor can increase the volume of sales taking in the CPNS functionalities which can add new features
- The content/service provider can enlarge the services. Also they can provide targeted service in easier and cheaper ways

B.3.4 Actors

- CPNS User
- CPNS Service Provider/Mobile Operator
- CPNS Device
- PN GW Device
- CPNS Server

B.4 PN Admin

B.4.1 Short Description

The concept of PN Admin is that the CPNS User administrates multiple CPNS Devices. A CPNS User can set a PNE or PN GW as PN Admin to control other devices.

Normally PN GWs have rich UI, however sometimes they have poor or no UI like WiFi AP or WiBro Egg. Not even PN GWs but also PNEs have the same issue, too. PN Admin can control them.

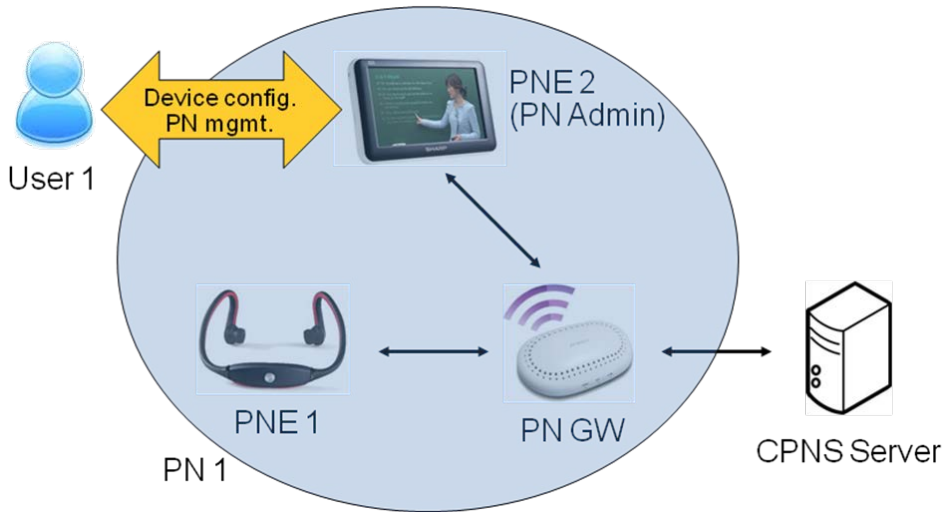

Figure 3 Use Case for PN Admin

B.4.2 Normal Flow

1. PNE 2 completes authentication from the CPNS Server to become PN Admin.
2. PN Admin (PNE 2) administrates PNE 1 and PN GW.
3. The CPNS Server redirects messages for PNE 2 and PN GW to PN Admin.
4. As PN Admin, PNE 2 sets itself as a display and PNE 1 as a headset.
5. The CPNS User enjoys streaming movies.
6. The CPNS User buys another audio device.

B.4.3 Market benefits

- The CPNS User can easily manage multiple CPNS Devices.
- The Content Provider can improve the quantity of Service/Content sales.
- The Operator can improve the quantity of data service

B.4.4 Actors

- CPNS User
- CPNS Service Provider/Mobile Operator
- CPNS Device
- CPNS Server