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The universAAL framework for user interaction in multimedia AAL spaces

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CONTENTS

FOREWORD 4
INTRODUCTION 6
1 Scope 8
2 Normative references 9
3 Terms, definitions and abbreviations 9
3.1 Terms and definitions 9
3.2 Abbreviation 12
4 The Specification of the universAAL UI Framework 12
4.1 Overview 12
4.2 Analysis of the relationships between UI Handlers and I/O Channels 13
4.3 Dialog descriptions 15
4.4 The Adaptation Concept 18
4.4.1 Overview 18
4.4.2 Responsibilities of Applications 18
4.4.3 Responsibilities of UI handlers 19
4.4.4 Responsibilities on the brokerage layer 20
4.5 Provisions of the UI Framework 22
4.5.1 Introduction 22
4.5.2 The UI Bus and its brokerage protocols 22
4.5.3 The dialog manager and its role in assisting the UI Bus 28
4.5.4 The Resource Manager 30
Annex A (informative) Use cases 31
A.1 Use Case: Supporting rich human computer interaction 31
A.2 Use Case: Healthy Lifestyle Service Package Use Case (universAAL) 32
Annex B (informative) An Overview of the universAAL Project 33
Bibliography 35

Figure 1 – Paradigm shift from HCI to HEI 6
Figure 2 – logical separation of application and presentation layers 7
Figure 3 – The scope of the specified UI framework marked by the green colour 8
Figure 4 – The notion of AAL spaces 9
Figure 5 – The need of smart environments to utilize channels for bridging between the physical world and the virtual realm 10
Figure 7 – The notion of a smart environment 11
Figure 8 – An open system for plugging in applications and UI handlers independently from each other 13
Figure 9 – Channel binding by I/O devices 13
Figure 10 – The notion of a driver with the case of a UPNP-aware driver 14
Figure 11 – The case of a universAAL aware driver 14
Figure 12 – Possible relationship between UI handlers and drivers 15
Figure 13 – The dialog package based on the notion of a form 16
Figure 14 – A possible graphical visualization of the mapping between dialog types and the predefined standard groups 17
Figure 15 – The universAAL framework for supporting adaptivity, which builds on top of the universAAL context and service buses (see footnote 4) 18

Figure 16 – A model for describing access impairments 20
Figure 17 – Summary of the adaptation parameters 21
Figure 18 – The components comprising the universAAL UI framework 22
Figure 19 – The main messages exchanged on the UI Bus 23
Figure 20 – The notion of a UI request as constructed by applications 23
Figure 21 – Overview of the sequence of actions when the priority check is positive 24
Figure 22 – The case of switching to a new UI handler when handling changes in the context 25
Figure 24 – The abstract class to be extended by applications that want to send UI requests to the UI bus 28
Figure 25 – The abstract class to be extended by UI handlers that accept UI requests forwarded by the UI bus for rendering 28
Figure 26 – The interface of the UI Bus 28
Figure 27 – Access to the resources managed by the RM 30
Figure B.1 – Project ID Card 33
Figure B.2 – The three pillars of the universAAL platform 34

INTERNATIONAL ELECTROTECHNICAL COMMISSION

THE UNIVERSAAL FRAMEWORK FOR USER INTERACTION IN MULTIMEDIA AAL SPACES

FOREWORD

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Draft PAS	**Report on voting**
100/2189/PAS	100/2228/RVD

Following publication of this PAS, which is a pre-standard publication, the technical committee or subcommittee concerned may transform it into an International Standard.

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INTRODUCTION

Ambient Assisted Living (AAL) strives to ensure the independence, safety, wellbeing and autonomy of users by using ICT, including multimedia systems and equipment and audio / video communication, for creating intelligent living environments that react to the needs of users by providing relevant assistance. Such intelligent environments can be labelled as AAL Spaces, which are characterized by a number of devices that can be stationary, mobile or embedded within other objects. Multiple users can find themselves in an AAL space simultaneously, possibly moving around within the AAL space, and entering and leaving it dynamically. These characteristics introduce new challenges when it comes to handling interaction with users in AAL spaces.

With the assumption that people are surrounded by highly distributed systems of networked interactive devices, AAL intensifies the paradigm shift from Human-Computer Interaction (HCI) to Human-Environment Interaction (HEI). One of the main challenges of HEI is to keep the multiplicity of functional units hidden to humans while making the functionality provided by them easily available based on natural ways of interaction. Instead of controlling each device separately, users should be able to interact with a whole device ensemble as one single unit and articulate goals instead of looking for functionality at the level of each single device separately (Figure 1).

Figure 1 – Paradigm shift from HCI to HEI

Another important challenge for designers and developers of systems in AAL spaces is that interaction with applications can take place through a variety of devices at different locations with different capabilities in terms of serving a single user privately or not, supported modalities, modality-specific parameters such as screen size and resolution, power consumption, etc., which implies the need in AAL spaces to logically separate the application layer from the presentation layer (Figure 2).

Consequently, applications have to use abstract user interfaces that are device-, modality-, and layout-neutral and allow to postpone the rendering of the user interface to the execution-time, which makes it possible to interact with users in a personalized and situation-aware way. The separation of concerns also facilitates the creation of clean programming interfaces based on an open and flexible architecture that have to enable the plug-and-play of both applications and user interaction handlers (UI handlers), and allows UI handlers to serve arbitrary applications.

The resulted openness complements the openness supported by IEC 62481-2 that enables the sharing of multimedia content and streams within an ensemble of devices. It adds the

perspective of *sharing the input and output channels provided by those devices*[1] to the DLNA perspective of content sharing.

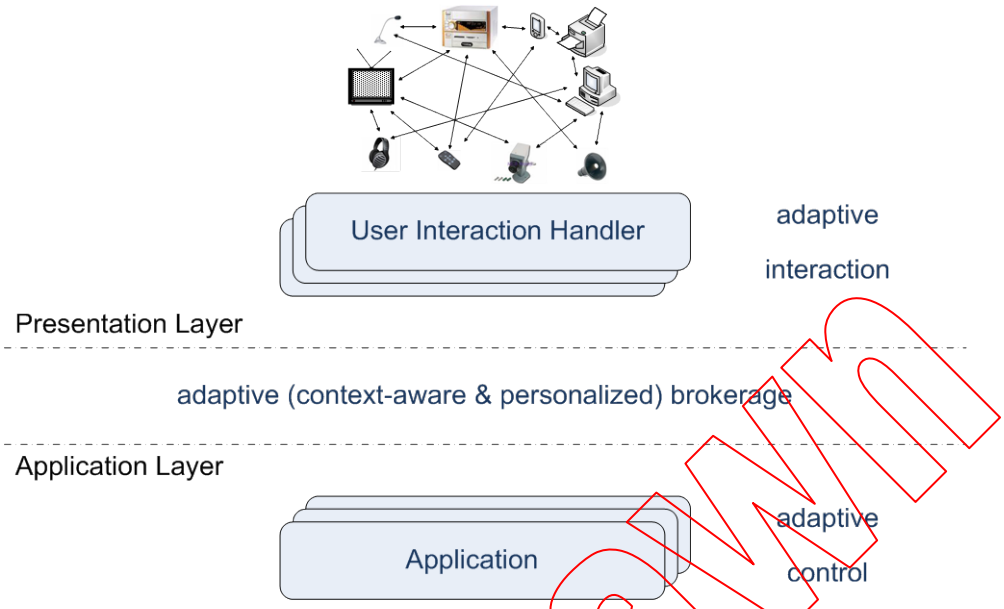

Figure 2 – logical separation of application and presentation layers

1 This understanding of the term I/O channel is based on the actual roles of devices that enable interaction with human users: a display provides a visual output channel, a loudspeaker, an audio output channel, and a microphone, an audio input channel.

THE UNIVERSAAL FRAMEWORK FOR USER INTERACTION IN MULTIMEDIA AAL SPACES

1 Scope

This Publicly Available Specification (PAS) specifies a framework for adaptive handling of explicit interaction among humans and AAL spaces. This is based on a differentiation between explicit and implicit interaction as a consequence of the paradigm shift from Human-Computer Interaction to Human-Environment Interaction, further explained in the definition of the latter term.

As a framework, a main subject matter of the specification is the identification of relevant areas for further standardization, thereby also looking at the interrelationships among the identified areas. The PAS also provides a first extensible specification in some of those areas.

The proposed UI framework has been derived from the logical separation of application and presentation layers as depicted by Figure 2, and encompasses the following elements (Figure 3):

- Analysis of the relationships between UI handlers and I/O devices without specifying possible languages, models, or abstract APIs for interaction with these devices, as there are certain international standardization activities that go in this direction[2];
- the language and model for describing application-specific dialogs / user interfaces as part of UI requests made by applications to the UI framework;
- the adaptation concept and parameters needed to achieve adaptive UI and the way they affect UI requests; and
- Protocols used by the UI framework to broker between UI handlers and applications as pluggable components.

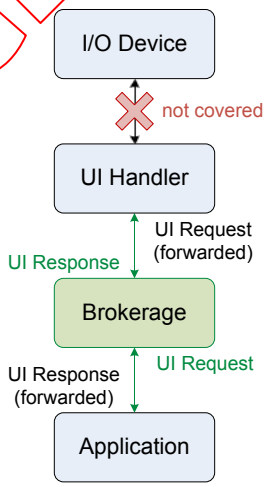

Figure 3 – The scope of the specified UI framework marked by the green colour

2 For example [3] on representing user input coming from input devices.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable 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.

IEC 62481-2, *Digital living network alliance (DLNA) home networked device interoperability guidelines – Part 2: DLNA media formats*

ISO/IEC Guide 71:2001, *Guidelines for standards developers to address the needs of older persons and persons with disabilities*

ISO 9241-11:1998, *Ergonomic requirements for office work with visual display terminals (VDTs) – Part 11: Guidance on usability*

ISO 9241-110:2006, *Ergonomics of human-system interaction - Part 110: Dialogue principles*