INTERNATIONAL STANDARD

ISO/IEC 24752-1

Second edition
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Information technology — User interfaces — Universal remote console —

Part 1:
General framework

Technologies de l'information — Interfaces utilisateur — Console à distance universelle —

Partie 1: Cadre général

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Contents

Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/IEC JTC 1, *Information technology*, SC 35, *User interfaces*.

This second edition cancels and replaces the first edition (ISO/IEC 24752-1:2008), which has been technically revised.

ISO/IEC 24752 consists of the following parts, under the general title *Information technology — User interfaces — Universal remote console*:

— *Part 1: Framework*

— *Part 2: User interface socket description*

— *Part 4: Target description*

— *Part 5: Resource description*

— *Part 6: Web service integration*

Introduction

This is the second edition of this part of ISO/IEC 24752. The main purpose of the revision is an alignment with recent developments in the web service area, in particular with the new ISO/IEC 24752-6, along with an overall simplification of the specified technologies.

This part of ISO/IEC 24752 is one of a set of International Standards to facilitate operation of information and electronic products through remote and alternative interfaces and intelligent agents. The purpose of ISO/IEC 24752-1 is to facilitate the development and deployment of a wide variety of devices (from different manufacturers) that can act as universal remote consoles (URCs) for an equally varied range of target devices and services (targets), also from different manufacturers. It allows users to control any number of information and electronic products in their environment.

The targets include both devices and services. They can range from things as simple as light switches and thermostats to more complex items such as audio-visual equipment, home appliances, in-car electronics, web services, and any other devices or services that can be controlled electronically (or via information technology).

Targets can be in the same location as the individual who desires to control the target through the URC, or at any distance from the URC/user as long as there is some type of network connection between the URC and the target. This is possible since a URC provides the user with all of the necessary controls as well as the prompts and other information displayed by the target.

The URCs could be software running on common mainstream devices such as personal computing and information technology devices (e.g. computers, laptops, tablet computers, smartphones, cell phones, or other telecommunications devices). They could also be functions implemented in assistive technology devices, or they could be devices which were specially built to function as URCs. They could be devices which were built to function primarily as a remote console for a particular family of products (e.g. a remote console designed to be part of a home audio-visual system), but could also serve to control any other devices compatible with this part of ISO/IEC 24752. They are similar to the behaviour of universal remote controls today, except for the following:

a) they have much greater function and scope,

b) they synchronize with the target in both directions (i.e. they can display the current status of the target),

c) they do not need to be programmed by the user (since they will automatically discover devices that are controllable in a user's vicinity, discover the abstracted user interface of the targets, and present it in the way preferred by the user and their URC), and

d) they can be used out of sight of the product they are controlling.

The URCs could be all visual, all tactile, or all verbal in nature, or any combination thereof, because this International Standard specifies the content of a target user interface independently from the form in which it is presented. Thus, URCs could be designed that an individual could talk to and, through the URC, the user could have speech access to any compatible target listed above without any of these targets having any voice recognition or voice control functionality themselves. A person might, therefore, be able to say to their URC, "Record channel 12 and show me 'Law and Order'". Or they could lie in bed and say, "Set the alarm to 6:30 AM, start brewing the coffee at 6:00 AM, and now set the home security system to 'active'". Or, if one's spouse is already asleep, a person could pick up their smartphone or any other compatible URC device and accomplish these same tasks silently either by calling up control panels or by issuing the instructions in writing.

NOTE   The URC framework does not provide the natural language control, but would provide all of the information and control necessary for control by a natural language processing URC.

Note that, although a URC implementation can involve hardware, requirements on this hardware such as safety and design requirements are not within the scope of this International Standard.

A more detailed overview of the URC framework is provided on the OpenURC Alliance's website, at http://openurc.org/urc-overview.[6]

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Information technology — User interfaces — Universal remote console —

Part 1:
General framework

1   Scope

ISO/IEC 24752 is a multi-part International Standard that facilitates operation of information and electronic products through remote and alternative interfaces and intelligent agents.

This part of ISO/IEC 24752 defines a framework of components that combine to enable remote user interfaces and remote control of network-accessible electronic devices and services through a universal remote console (URC). It provides an overview of the URC framework and its components.

2   Conformance

2.1   URC

A conforming URC shall conform to the URC requirements as specified in Clauses 4 and 8.

Table 1 summarizes the requirements on URCs.

Table 1 — Summary of URC requirements

Requirement ("A URC shall ...")	See subclause
Retrieve documents from a target, including recognition of MIME types	4.2.3
Interpret a target description so that it can identify a target and open a control session with one of its sockets	4.2.4
Support the invocation of a target's locator function	4.2.5
Support an open session request to a target	4.3.2
Support a URC close session event to a target	4.3.5
Support an abort session event from a target	4.3.6
Track connection status information from the underlying network (TUN)	4.3.7
Synchronize values of socket variables	4.4.2
Request invocation of a socket command, including support for local parameters and command state updates	4.4.3
Receive and acknowledge notifications, including support for stacking notifications and their states	4.4.4
Synchronize actual indices of socket sets and elements	4.4.5
Support the 'timeout' attribute on notifications	4.4.7
Provide at least one target-URC network link (see 7.2 for TUN requirements)	4.5.1
Support reception and updating of dynamic atomic resources at runtime	4.5.2
Provide a concrete user interface for a control session with a target's socket	4.7
Implement the security and privacy functions available from the implemented TUNs	8.2

2.2   Target

A conforming target shall meet all requirements specified in Clauses 5 and 8.

Table 2 summarizes the requirements on targets.

Table 2 — Summary of target requirements

Requirement ("A target shall …")	See subclause
Have an instance identifier	5.1.2
Provide a fetch mechanism for its documents to be retrieved by URI, including support for MIME types (see NOTE below)	5.1.3
Provide exactly one target description with references to all socket descriptions, required resource sheets, and grouping sheet (see NOTE below)	5.1.4
Support locator functions	5.1.5
Provide one or more user interface sockets that collectively provide access to all of the functionality provided by the built-in user interface of the target	5.2.2
Inside a target's socket are the following: — the *variables* shall include all of the dynamic data on the target socket's state a user can perceive and/or manipulate, — the *commands* shall include all of the target functions that can be called explicitly or implicitly by users, and — the *notifications* shall cover all exceptions that the target needs to inform the user about	5.2.3
Provide a user interface socket description for each of the target's sockets (see NOTE below)	5.3
Provide the required target resources in at least one natural language for the following: — one grouping resource for every socket of the target, — label resources (textual)	5.4.6
Support an open session request from a URC	5.5.1
Support a suspend session request from a URC	5.5.2
Support a resume session request from a URC	5.5.3
Support a close session event from a URC	5.5.4
Send an abort session event in case of user session abortion	5.5.5
Track connection status information from the underlying TUN network	5.5.6
Send a session forward event to the URC in case of session forwarding	5.5.7
Create and maintain a session between a socket and the URC after a successful open session request	5.6.1
Indicate to the URC the availability of socket elements at runtime	5.6.3
Synchronize the socket variables between the socket and the URCs that participate in a joint session with the socket	5.6.5
Support command invocation requests from a URC (including handling of local parameters) and synchronization of command states	5.6.6
Support propagation of notification states and, for custom-type notifications, embedded variables and commands, to the connected URCs, and acceptance of pertinent acknowledgments	5.6.7
Synchronize actual indices of socket sets and elements	5.6.8
Not rely on the URC doing the interpretation of socket element dependencies	5.6.9

Table 2 *(continued)*

Requirement ("A target shall …")	See subclause
Provide the following mechanisms with regard to user response timeouts: — after a timeout extension return to the state of the task the user had reached prior to the timeout, — use the 'timeout' attribute on notifications to represent timeout durations, — note time out notifications in less than 10 seconds	5.6.10
Provide at least one target-URC network link (see 7.2 for TUN requirements)	5.7

NOTE   As an alternative to having the target provide these documents (target description, socket descriptions, required atomic resources and grouping), they may be provided separately as supplemental resources, if the target is a legacy product that already provides the necessary communication and control functionality through a networking platform (target-URC network).

3   Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
access key resource
atomic resource that specifies a single character that can be used in combination with a URC-specific mechanism to move the focus to an element of an interface

Note 1 to entry: Note1 to entry: When an access key is bound to a command, entering the access key will activate the command.

3.2
atomic resource
resource that is used as an atomic entity in the construction of a concrete user interface

EXAMPLE   Atomic resources include label resources, help resources, access key resources, keyword resources, and location descriptions.

Note 1 to entry: An atomic resource may be of any form, including text, images, sounds, animations, and video clips. See ISO/IEC 24752-5.

3.3
atomic resource description
resource description of atomic resources

Note 1 to entry: ISO/IEC 24752-5 specifies a format for atomic resource descriptions.

3.4
command
socket command
socket element representing a core function that a user can request a target to perform that cannot be achieved through the manipulation of the value of a single variable

EXAMPLE   A 'reset' or 'submit' operation.

Note 1 to entry: See ISO/IEC 24752-2.

3.5
command parameter
socket command parameter
variable whose value is used for the execution of a command

Note 1 to entry: See ISO/IEC 24752-2.

**3.6
connection**
association established between functional units for data transmission

[SOURCE: American National Standard Dictionary of Information Technology (ANSDIT)]

**3.7
context of use**
use context
users, tasks, equipment (hardware, software, and materials), and the physical and social environments in which a product is used

[SOURCE: ISO 9241-11:1998, 3.5]

**3.8
control phase**
time period during which a URC and a target initiate maintain and terminate a control session between the URC and a specific target socket

**3.9
dependency**
expression that defines a relationship between a property of a socket variable, command, or notify element and the values of other socket elements

**3.10
device**
physical device with a built-in user interface that can also be controlled electronically

EXAMPLE   light switches, thermostats, home appliances, audio-visual equipment, vending machines, and point-of-sale devices.

**3.11
dimensional socket element**
dimensional element
homogenous set of values pertaining to a socket element

Note 1 to entry: See ISO/IEC 24752-2.

**3.12
dimensional socket set**
repeating socket set
homogenous collection of sets with different indices

Note 1 to entry: See ISO/IEC 24752-2.

**3.13
discovery**
process by which a URC locates and connects to targets in its environment

**3.14
discovery phase**
time period during which a URC scans the environment for available targets and identifies their sockets

**3.15
dynamic atomic resource**
atomic resource that is provided by the target at runtime

**3.16
element**
fundamental logical unit of an XML document

3.17
global parameter
global command parameter
reference from a command to a variable that serves as an input or output parameter for the command

Note 1 to entry: See ISO/IEC 24752-2.

3.18
grouping resource
grouping
hierarchical structure of user interface socket elements or user interface implementation description elements in a top-down fashion that is provided externally to a socket description

Note 1 to entry: Syntax and semantics of grouping resources are defined in ISO/IEC 24752-5.

3.19
grouping sheet
file that contains grouping resources

Note 1 to entry: Syntax and semantics of grouping sheets are defined in ISO/IEC 24752-5.

3.20
help resource
atomic resource intended to be used to provide help to a user of a target

3.21
input parameter
variable whose value is read by the target before execution of a command, to affect the execution and its result(s)

Note 1 to entry: See ISO/IEC 24752-2.

3.22
input-output parameter
variable used as input and output parameter for the same command

Note 1 to entry: See ISO/IEC 24752-2.

3.23
interface generator
software that generates a user interface for a target that is appropriate for a known context of use

Note 1 to entry: In the context of ISO/IEC 24752, interface generation is typically based on a socket description, resource sheets, and grouping sheets.

3.24
keyword resource
atomic resource that specifies a keyword pertaining to a referenced element

3.25
label resource
atomic resource used to label, identify, or present an element in a user interface

EXAMPLE   The label "John F Kennedy International Airport" could be used to present the value "JFK", or the label "Destination" could be used to identify an input field where the user must enter a travel destination.

3.26
local parameter
input or output parameter that is attached to a command

Note 1 to entry: See ISO/IEC 24752-2.

3.27
locator function
locator
function of a target that can be invoked by the user and that helps the user to locate the target

EXAMPLE   Audio functions such as a beep or bell, visual functions such as a flash, and direction based functions such as an "infrared ping" function.

3.28
notification
special state of a target in which normal operation is suspended

EXAMPLE   An exception state.

Note 1 to entry: See ISO/IEC 24752-2.

3.29
notify element
socket notify element
socket element that represents a notification

3.30
output parameter
command result
variable whose value is updated by the target after execution of a command, to reflect a result of the execution

Note 1 to entry: See ISO/IEC 24752-2.

3.31
resource
object that is used as an entity or to support decision making in the construction of a concrete user interface

EXAMPLE   Resources include user interface implementation description, resource sheet, and any kind of atomic resource such as label resources, help resources, access key resources, and keyword resources.

Note 1 to entry: See ISO/IEC 24752-5.

3.32
resource description
description of a resource in terms of its properties

Note 1 to entry: The format of a resource description is specified in ISO/IEC 24752-5.

3.33
resource service
service that provides resources from target manufacturers and any third parties such as URC manufacturers, beyond the target resources

Note 1 to entry: See ISO/IEC 24752-5.

3.34
resource service description
description of any reference to a resource service

Note 1 to entry: The format of a resource service description is specified in ISO/IEC 24752-5.

3.35
resource sheet
file that contains atomic resource descriptions

Note 1 to entry: The format of a resource sheet is specified in ISO/IEC 24752-5.

3.36
resource-URC network
RUN
network connecting the URC to sources of supplemental resources and user interface implementation descriptions (UIIDs)

Note 1 to entry: It may employ any networking and connection technologies.

3.37
resource-URC network link
RUNL
link from the URC to the resource-URC network

3.38
service
functionality made available to a user electronically

EXAMPLE   An airline reservation service, currency translation services, weather forecasting, restaurant recommendations, etc.

3.39
session
Control Session
period of connection between a target's socket and a URC for the purpose of user operation of the socket through a URC

3.40
session-full target
target that requires opening a session with a URC for a part or all of its functionality

3.41
session-less target
target that provides all of its functionality to any URC without requiring a session

3.42
shared sessions
sessions of one socket in which the socket element values are common or shared (across sessions) for socket elements with the same identifier

3.43
socket
user interface socket
machine-operable access and control point for a target

Note 1 to entry: See ISO/IEC 24752-2.

3.44
socket description
user interface socket description
specification that describes the functions and properties of a socket

Note 1 to entry: A socket description is expressed in XML with the markup language specified in ISO/IEC 24752-2.

3.45
socket element
variable, command, or notify element

Note 1 to entry: See ISO/IEC 24752-2.

3.46
socket element component
one value out of a set of values for a dimensional socket element

Note 1 to entry: See ISO/IEC 24752-2.

3.47
socket set
set
set composed of socket elements and other sets

Note 1 to entry: See ISO/IEC 24752-2.

3.48
static atomic resource
atomic resource that is provided before runtime, e.g. through a resource sheet

3.49
supplemental atomic resource
supplemental resource that is used as an atomic entity in the construction of a concrete user interface

3.50
supplemental grouping resource
supplemental grouping
grouping resource that is provided externally to the target, by resource services

3.51
supplemental label
label resource made available externally to a target

3.52
supplemental resource
resource made available externally to a target

3.53
target
device or service that the user wishes to use

EXAMPLE   Video cassette recorder (VCR), online telephone directory.

Note 1 to entry: See ISO/IEC 24752-2.

3.54
target atomic resource
target resource that is used as an atomic entity in the construction of a concrete user interface

3.55
target description
TD
document containing information on a target that is necessary for discovery of and access to the target
and its sockets

Note 1 to entry: There is one target description per target.

3.56
target instance identifier
identifier for a target instance that is unique among all targets with the same name

3.57
target resource
resource that is provided by a target in its local network environment

3.58
target-URC network
TUN
network connecting the target and the URC, which may employ any networking and connection technologies

Note 1 to entry: Examples of connection technologies include Ethernet, Bluetooth, and 802.11. Examples of networking technologies include UPnP and Java/Jini.

3.59
target-URC network link
TUNL
link between a target or a URC and the target-URC network

Note 1 to entry: Each TUNL is specific to the particular networking and connection technologies that are used.

EXAMPLE   A "UPnP on Bluetooth TUNL", a "Jini on 802.11b TUNL", or a "Jini on Bluetooth TUNL".

3.60
universal remote console
URC
device or software through which the user accesses a target

Note 1 to entry: The URC is capable of rendering a user interface for any target. It is "universal" in the sense that it can be used to control any target. It is assumed that users will choose a URC capable of meeting their personal interaction requirements.

3.61
user interface
UI
means by which a user interacts with a target

Note 1 to entry: The interface includes information displayed to the user, values the user can enter or manipulate, and all other actions the user can instruct the target to take.

3.62
user interface implementation description
UIID
description for implementing a user interface to a target, based on the target's socket

Note 1 to entry: May take the form of a standard description of a user interface, or consist of executable code intended for a particular class of URC.

3.63
variable
socket variable
socket element representing a value relevant to the target's user interface that may be varied by the target or the user

Note 1 to entry: See ISO/IEC 24752-2.

4   Universal remote console (URC) requirements

4.1   General

A universal remote console (URC) is a device or software through which the user accesses a target. The URC is "universal" in the sense that it can be used to control any compliant target. It presents interfaces for compliant targets to the user and relays user actions to these targets. The URC may present the information to the user in whatever form (visual, auditory, etc) works for the user, the URC, and the environment (e.g. driving, in a quiet environment, etc). This International Standard does not impose any requirements on which form a user uses.