

# INTERNATIONAL STANDARD



Information technology – UPnP device architecture –  
Part 18-10: Remote Access Device Control Protocol – Remote Access Inbound  
Connection Configuration Service

ISO/IEC 29341-18-10:2011

<https://standards.iteh.ai/catalog/standards/sist/5be308b5-c9c3-45f0-9849-435b0c1223a3/iso-iec-29341-18-10-2011>



**THIS PUBLICATION IS COPYRIGHT PROTECTED**  
**Copyright © 2011 ISO/IEC, Geneva, Switzerland**

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester.

If you have any questions about ISO/IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

IEC Central Office  
3, rue de Varembe  
CH-1211 Geneva 20  
Switzerland  
Email: [inmail@iec.ch](mailto:inmail@iec.ch)  
Web: [www.iec.ch](http://www.iec.ch)

### **About the IEC**

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

### **About IEC publications**

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigenda or an amendment might have been published.

- Catalogue of IEC publications: [www.iec.ch/searchpub](http://www.iec.ch/searchpub)

The IEC on-line Catalogue enables you to search by a variety of criteria (reference number, text, technical committee,...). It also gives information on projects, withdrawn and replaced publications.

- IEC Just Published: [www.iec.ch/online\\_news/justpub](http://www.iec.ch/online_news/justpub)

Stay up to date on all new IEC publications. Just Published details twice a month all new publications released. Available on-line and also by email.

- Electropedia: [www.electropedia.org](http://www.electropedia.org)

The world's leading online dictionary of electronic and electrical terms containing more than 20 000 terms and definitions in English and French, with equivalent terms in additional languages. Also known as the International Electrotechnical Vocabulary online.

- Customer Service Centre: [www.iec.ch/webstore/customerservice](http://www.iec.ch/webstore/customerservice)

If you wish to give us your feedback on this publication or need further assistance, please visit the Customer Service Centre FAQ or contact us:

Email: [csc@iec.ch](mailto:csc@iec.ch)  
Tel.: +41 22 919 02 11  
Fax: +41 22 919 03 00



ISO/IEC 29341-18-10

Edition 1.0 2011-08

# INTERNATIONAL STANDARD



Information technology – UPnP device architecture –  
Part 18-10: Remote Access Device Control Protocol – Remote Access Inbound  
Connection Configuration Service

ISO/IEC 29341-18-10:2011

<https://standards.iteh.ai/catalog/standards/sist/5be308b5-c9c3-45f0-9849-435b0c1223a3/iso-iec-29341-18-10-2011>

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

PRICE CODE

G

ICS 35.200

ISBN 978-2-88912-650-7

## CONTENTS

1	Overview and Scope.....	3
1.1	Introduction.....	3
1.2	Notation.....	3
1.3	Vendor-defined Extensions.....	4
1.4	References.....	4
1.4.1	Normative References.....	4
1.4.2	Informative References.....	4
2	Service Modeling Definitions.....	5
2.1	Service Type.....	5
2.2	Terms and Abbreviations.....	5
2.2.1	Abbreviations.....	5
2.3	<i>InboundConnectionConfig</i> Service Architecture.....	5
2.4	State Variables.....	5
2.4.1	State Variable Overview.....	5
2.4.2	<i>DynamicDNSSupportedProtocols</i> .....	6
2.4.3	<i>DynamcDNSConfigInfo</i> .....	6
2.4.4	<i>STUNServerAddress</i> .....	6
2.4.5	<i>NetworkTopologyInfo</i> .....	6
2.5	Eventing and Moderation.....	7
2.5.1	Relationships Between State Variables.....	7
2.6	Actions.....	7
2.6.1	<i>GetDynamicDNSSupportedProtocols()</i> .....	7
2.6.2	<i>SetDynamicDNSConfigInfo()</i> .....	8
2.6.3	<i>SetSTUNServerAddress()</i> .....	9
2.6.4	<i>GetNetworkTopologyInfo()</i> .....	9
2.6.5	Relationships Between Actions.....	11
2.6.6	Error Code Summary.....	11
2.7	Theory of Operation.....	11
3	XML Service Description.....	12
4	Test.....	13
	Annex A (normative) <i>InboundConnectionConfig</i> Data Structures.....	14
A.1	<i>DynamicDNSConfig</i> Template.....	14
A.2	<i>NetworkTopologyInfo</i> Template.....	15
	Table 2-1 — Abbreviations.....	5
	Table 2-2 — State Variables.....	5
	Table 2-3 — Eventing and Moderation.....	7
	Table 2-4 — Actions.....	7
	Table 2-5 — Arguments for <i>GetDynamicDNSSupportedProtocols()</i> .....	7
	Table 2-6 — Error Codes for <i>GetDynamicDNSSupportedProtocols()</i> .....	8
	Table 2-7 — Arguments for <i>SetDynamicDNSConfigInfo()</i> .....	8
	Table 2-8 — Error Codes for <i>SetDynamicDNSConfigInfo()</i> .....	9
	Table 2-9 — Arguments for <i>SetSTUNServerAddress()</i> .....	9

Table 2-10 — Error Codes for <a href="#"><u>SetSTUNServerAddress()</u></a> .....	9
Table 2-11 — Arguments for <a href="#"><u>GetNetworkTopologyInfo()</u></a> .....	10
Table 2-12 — NetworkTopologyInfo meaning in UPnP Remote Access 1.0 .....	10
Table 2-13 — Error Codes for <a href="#"><u>GetNetworkTopologyInfo()</u></a> .....	11
Table 2-14 — Error Code Summary .....	11

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

[ISO/IEC 29341-18-10:2011](#)

<https://standards.iteh.ai/catalog/standards/sist/5be308b5-c9c3-45f0-9849-435b0c1223a3/iso-iec-29341-18-10-2011>

## INFORMATION TECHNOLOGY – UPNP DEVICE ARCHITECTURE –

### Part 18-10: Remote Access Device Control Protocol – Remote Access Inbound Connection Configuration Service

#### FOREWORD

- 1) ISO (International Organization for Standardization) and IEC (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. Their preparation is entrusted to technical committees; any ISO and IEC member body interested in the subject dealt with may participate in this preparatory work. International governmental and non-governmental organizations liaising with ISO and IEC also participate in this preparation.
- 2) In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.
- 3) The formal decisions or agreements of IEC and ISO on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC and ISO member bodies.
- 4) IEC, ISO and ISO/IEC publications have the form of recommendations for international use and are accepted by IEC and ISO member bodies in that sense. While all reasonable efforts are made to ensure that the technical content of IEC, ISO and ISO/IEC publications is accurate, IEC or ISO cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 5) In order to promote international uniformity, IEC and ISO member bodies undertake to apply IEC, ISO and ISO/IEC publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any ISO/IEC publication and the corresponding national or regional publication should be clearly indicated in the latter.
- 6) ISO and IEC provide no marking procedure to indicate their approval and cannot be rendered responsible for any equipment declared to be in conformity with an ISO/IEC publication.
- 7) All users should ensure that they have the latest edition of this publication.
- 8) No liability shall attach to IEC or ISO or its directors, employees, servants or agents including individual experts and members of their technical committees and IEC or ISO member bodies for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication of, use of, or reliance upon, this ISO/IEC publication or any other IEC, ISO or ISO/IEC publications.
- 9) Attention is drawn to the normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 10) Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

International Standard ISO/IEC 29341-18-10 was prepared by UPnP Forum Steering committee<sup>1</sup>, was adopted, under the fast track procedure, by subcommittee 25: Interconnection of information technology equipment, of ISO/IEC joint technical committee 1: Information technology.

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

This International Standard has been approved by vote of the member bodies, and the voting results may be obtained from the address given on the second title page.

---

<sup>1</sup> UPnP Forum Steering committee, UPnP Forum, 3855 SW 153<sup>rd</sup> Drive, Beaverton, Oregon 97006 USA. See also "Introduction".

**IMPORTANT – The “colour inside” logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this publication using a colour printer.**

## **iTeh STANDARD PREVIEW (standards.iteh.ai)**

[ISO/IEC 29341-18-10:2011](https://standards.iteh.ai/catalog/standards/sist/5be308b5-c9c3-45f0-9849-435b0c1223a3/iso-iec-29341-18-10-2011)

<https://standards.iteh.ai/catalog/standards/sist/5be308b5-c9c3-45f0-9849-435b0c1223a3/iso-iec-29341-18-10-2011>

## 1 Overview and Scope

This service definition is compliant with the UPnP Device Architecture version 1.0. It defines a service type referred to herein as *InboundConnectionConfig* service.

### 1.1 Introduction

The *InboundConnectionConfig* service is a UPnP service that allows control points to configure the parameters that will enable the service to test if the host device is reachable from the internet. InboundConnectionConfig uses Dynamic DNS to manage at least one public address for home-network services; it uses STUN to ensure that any intermediate NAT device is navigatable, i.e. it is a full-cone NAT. Thus, this service provides control points with the following functionality:

- Configure the dynamic DNS client co-located with the service,
- Configure the STUN client co-located with the service,
- Check if the device hosting the service is reachable from the internet.

This service does not address:

- Configuration of relay services in the public network, e.g. TURN.

### 1.2 Notation

- In this document, features are described as Required, Recommended, or Optional as follows:

The key words “MUST,” “MUST NOT,” “REQUIRED,” “SHALL,” “SHALL NOT,” “SHOULD,” “SHOULD NOT,” “RECOMMENDED,” “MAY,” and “OPTIONAL” in this specification are to be interpreted as described in [RFC 2119].

In addition, the following keywords are used in this specification:

**PROHIBITED** – The definition or behavior is an absolute prohibition of this specification. Opposite of **REQUIRED**.

**CONDITIONALLY REQUIRED** – The definition or behavior depends on a condition. If the specified condition is met, then the definition or behavior is **REQUIRED**, otherwise it is **PROHIBITED**.

**CONDITIONALLY OPTIONAL** – The definition or behavior depends on a condition. If the specified condition is met, then the definition or behavior is **OPTIONAL**, otherwise it is **PROHIBITED**.

These keywords are thus capitalized when used to unambiguously specify requirements over protocol and application features and behavior that affect the interoperability and security of implementations. When these words are not capitalized, they are meant in their natural-language sense.

- Strings that are to be taken literally are enclosed in “double quotes”.
- Placeholder values that need to be replaced are enclosed in the curly brackets “{” and “}”.
- 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.
- A double colon delimiter, “::”, 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.



### 1.3 Vendor-defined Extensions

Whenever vendors create additional vendor-defined state variables, actions or properties, their assigned names and XML representation MUST follow the naming conventions and XML rules as specified in [DEVICE], Clause 2.5, “Description: Non-standard vendor extensions”.

### 1.4 References

#### 1.4.1 Normative References

This clause lists the normative references used in this specification and includes the tag inside square brackets that is used for each such reference:

[DEVICE] – UPnP Device Architecture, version 1.0, UPnP Forum, June 13, 2000. Available at: <http://www.upnp.org/specs/arch/UPnP-arch-DeviceArchitecture-v1.0-20080424.pdf>. Latest version available at: <http://www.upnp.org/specs/arch/UPnP-arch-DeviceArchitecture-v1.0.pdf>.

[ICCDXSXD] – XML Schema for UPnP RA InboundConnectionConfig XML Data Structures. Available at: <http://www.upnp.org/schemas/ra/iccds-v1-20090930.xsd>. Latest version available at: <http://www.upnp.org/schemas/ra/iccds-v1.xsd>.

[RAServer] – RAServer:1, UPnP Forum, Available at: <http://www.upnp.org/specs/ra/UPnP-ra-RAServer-v1-Device-20090930.pdf>. Latest version available at: <http://www.upnp.org/specs/ra/UPnP-ra-RAServer-v1-Device.pdf>.

[RFC 1034] – IETF RFC 1034, DOMAIN NAMES - CONCEPTS AND FACILITIES, P. Mockapetris, November 1987 Available at: <http://www.ietf.org/rfc/rfc1034.txt>

[RFC 1035] – IETF RFC 1035, DOMAIN NAMES - IMPLEMENTATION AND SPECIFICATION, P. Mockapetris, November 1987 Available at: <http://www.ietf.org/rfc/rfc1035.txt>

[RFC 2119] – IETF RFC 2119, Key words for use in RFCs to Indicate Requirement Levels, S. Bradner, March 1997. Available at: <http://www.ietf.org/rfc/rfc2119.txt>

[RFC 2136] – IETF RFC 2136, Dynamic Updates in the Domain Name System (DNS UPDATE), P. Vixie (Editor), April 1997 Available at: <http://www.ietf.org/rfc/rfc2136.txt>

[RFC 3489] – IETF RFC 3489, STUN - Simple Traversal of User Datagram Protocol (UDP) Through Network Address Translators (NATs), J. Rosenberg, et. Al., March 2003 Available at: <http://www.ietf.org/rfc/rfc3489.txt>

[RFC 3986] – IETF RFC 3986, Uniform Resource Identifier (URI): Generic Syntax, Tim Berners-Lee, et. Al., January 2005. Available at: <http://www.ietf.org/rfc/rfc3986.txt>

[XML] – “Extensible Markup Language (XML) 1.0 (Third Edition)”, François Yergeau, Tim Bray, Jean Paoli, C. M. Sperberg-McQueen, Eve Maler, eds., W3C Recommendation, February 4, 2004. Available at: <http://www.w3.org/TR/2004/REC-xml-20040204/>.

#### 1.4.2 Informative References

This clause lists the informative references that are provided as information in helping understand this specificatio:

[IGD] – InternetGatewayDevice:1, UPnP Forum, November, 2001 Available at: [http://www.upnp.org/standardizeddcp/docs/documents/UPnP\\_IGD\\_1.0.zip](http://www.upnp.org/standardizeddcp/docs/documents/UPnP_IGD_1.0.zip).

[RAARCH] – RAArchitecture:1, UPnP Forum, Available at:  
<http://www.upnp.org/specs/ra/UPnP-ra-RAArchitecture-v1-20090930pdf>. Latest version  
 available at: <http://www.upnp.org/specs/ra/UPnP-ra-RAArchitecture-v1.pdf>.

[TURN] – IETF Internet Draft, Traversal Using Relays around NAT (TURN): Relay Extensions to Session Traversal Utilities for NAT (STUN), J. Rosenberg, July 8, 2007 Available at: <http://www.ietf.org/internet-drafts/draft-ietf-behave-turn-04.txt>

## 2 Service Modeling Definitions

### 2.1 Service Type

The following service type identifies a service that is compliant with this specification:

urn:[schemas-upnp-org:service:InboundConnectionConfig:1](#)

[InboundConnectionConfig](#) service is used herein to refer to this service type.

### 2.2 Terms and Abbreviations

#### 2.2.1 Abbreviations

Table 2-1 — Abbreviations

Definition	Description
DNS	Domain Name System
FQDN	Fully Qualified Domain Name
NAT	Network Address Translation
RAS	Remote Access Server
STUN	Simple Traversal of UDP Through NATs
TURN	Traversal Using Relays around NAT

#### 2.3 [InboundConnectionConfig](#) Service Architecture

This service provides the features that enable the end user to determine if a Remote Access Server can be deployed in the home network by checking if the Remote Access Server is reachable from the Internet.

#### 2.4 State Variables

*Reader Note: For a first-time reader, it may be more helpful to read the action definitions before reading the state variable definitions.*

##### 2.4.1 State Variable Overview

Table 2-2 — State Variables

Variable Name	R/O <sup>a</sup>	Data Type	Allowed Values	Eng. Units
<a href="#">DynamicDNSSupportedProtocols</a>	<i>R</i>	<a href="#">string</a>	CSV( <a href="#">string</a> ) See Clause 2.4.2	
<a href="#">DynamicDNSConfigInfo</a>	<i>R</i>	<a href="#">string</a>	See Clause 2.4.3	
<a href="#">STUNServerAddress</a>	<i>R</i>	<a href="#">string</a>	See Clause 2.4.4	
<a href="#">NetworkTopologyInfo</a>	<i>R</i>	<a href="#">string</a>	See Clause 2.4.5	

Variable Name	R/O <sup>a</sup>	Data Type	Allowed Values	Eng. Units
<sup>a</sup> <u>R</u> = Required, <u>O</u> = Optional, <u>X</u> = Non-standard				

**2.4.2 DynamicDNSSupportedProtocols**

This state variable contains the list of protocols supported by the Dynamic DNS client. If an Internet service provider maintains the DNS to always reflect the dynamically-allocated or statically-assigned public IP address, then this is signaled by the name “RFC2136”, which indicates Dynamic DNS configuration is not required. Otherwise, the name of the protocol indicates how to configure Dynamic DNS with a commercial provider.

**2.4.3 DynamicDNSConfigInfo**

This state variable contains the configuration information for the Dynamic DNS client. The structure of the DynamicDNSConfigInfo state variable is a ICCDS XML Document:

- <dynamicDNSConfig> is the root element.
- See the ICCS schema [ICCDXSD] for more details on the structure. The available properties and their names are described in Clause A.1.

Note that since the value of DynamicDNSConfigInfo is XML, it needs to be escaped (using the normal XML rules: [XML] Clause 2.4 Character Data and Markup) before embedding in a SOAP response message.

**2.4.4 STUNServerAddress**

This state variable contains IP address or the Fully Qualified Domain Name of the STUN server.



[ISO/IEC 29341-18-10:2011](https://standards.iteh.ai/catalog/standards/sist/5be308b5-c9c3-45f0-9849-435b0c1223a3/iso-iec-29341-18-10-2011)

**2.4.5 NetworkTopologyInfo**

[ds.iteh.ai/catalog/standards/sist/5be308b5-c9c3-45f0-9849-435b0c1223a3/iso-iec-29341-18-10-2011](https://standards.iteh.ai/catalog/standards/sist/5be308b5-c9c3-45f0-9849-435b0c1223a3/iso-iec-29341-18-10-2011)

This state variable contains the information about the topology of the network located between the device hosting the service and the public internet. It includes the information collected by the STUN client about the NAT devices and types or from the IGD if the service is not co-located with the residential gateway.

The structure of the NetworkTopologyInfo state variable is a ICCDS XML Document:

- <networkTopologyInfo> is the root element.
- See the ICCS schema [ICCDXSD] for more details on the structure. The available properties and their names are described in Clause A.2.

Note that since the value of NetworkTopologyInfo is XML, it needs to be escaped (using the normal XML rules: [XML] Clause 2.4 Character Data and Markup) before embedding in a SOAP response message.