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INTERNATIONAL STANDARD

Information technology – UPnP Device Architecture –
Part 8-19: Internet Gateway Device Control Protocol – Wide Area Network Plain Old Telephone Service Link Configuration Service

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FOREWORD

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ISO/IEC 29341-8-19 was prepared by UPnP Implementers Corporation and adopted, under the PAS procedure, by joint technical committee ISO/IEC JTC 1, *Information technology*, in parallel with its approval by national bodies of ISO and IEC.

The list of all currently available parts of the ISO/IEC 29341 series, under the general title *Universal plug and play (UPnP) 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.

ORIGINAL UPNP DOCUMENTS
(informative)

Reference may be made in this document to original UPnP documents. These references are retained in order to maintain consistency between the specifications as published by ISO/IEC and by UPnP Implementers Corporation. The following table indicates the original UPnP document titles and the corresponding part of ISO/IEC 29341:

UPnP Document Title	ISO/IEC 29341 Part
UPnP Device Architecture 1.0	ISO/IEC 29341-1
UPnP Basic:1 Device	ISO/IEC 29341-2
UPnP AV Architecture:1	ISO/IEC 29341-3-1
UPnP MediaRenderer:1 Device	ISO/IEC 29341-3-2
UPnP MediaServer:1 Device	ISO/IEC 29341-3-3
UPnP AVTransport:1 Service	ISO/IEC 29341-3-10
UPnP ConnectionManager:1 Service	ISO/IEC 29341-3-11
UPnP ContentDirectory:1 Service	ISO/IEC 29341-3-12
UPnP RenderingControl:1 Service	ISO/IEC 29341-3-13
UPnP MediaRenderer:2 Device	ISO/IEC 29341-4-2
UPnP MediaServer:2 Device	ISO/IEC 29341-4-3
UPnP AV Datastructure Template:1	ISO/IEC 29341-4-4
UPnP AVTransport:2 Service	ISO/IEC 29341-4-10
UPnP ConnectionManager:2 Service	ISO/IEC 29341-4-11
UPnP ContentDirectory:2 Service	ISO/IEC 29341-4-12
UPnP RenderingControl:2 Service	ISO/IEC 29341-4-13
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UPnP TemperatureSetpoint:1 Service	ISO/IEC 29341-6-16
UPnP HVAC_UserOperatingMode:1 Service	ISO/IEC 29341-6-17
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UPnP QosManager:1 Service	ISO/IEC 29341-10-11
UPnP QosPolicyHolder:1 Service	ISO/IEC 29341-10-12
UPnP QoS Architecture:2	ISO/IEC 29341-11-1
UPnP QOS v2 Schema Files	ISO/IEC 29341-11-2

UPnP Document Title	ISO/IEC 29341 Part
UPnP QosDevice:2 Service	ISO/IEC 29341-11-10
UPnP QosManager:2 Service	ISO/IEC 29341-11-11
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UPnP RemoteUIClient:1 Service	ISO/IEC 29341-12-10
UPnP RemoteUIServer:1 Service	ISO/IEC 29341-12-11
UPnP DeviceSecurity:1 Service	ISO/IEC 29341-13-10
UPnP SecurityConsole:1 Service	ISO/IEC 29341-13-11

1. Overview and Scope

This service definition is compliant with the UPnP Device Architecture version 1.0.

This service-type models physical and link layer properties specific to a Plain Old Telephone System (POTS) modem used for Internet access on an ***InternetGatewayDevice***[*]. These properties are common across the different instances of ***WANPPPConnection*** on the same ***WANDevice***.

The service is OPTIONAL (for gateways that support an integrated POTS modem) and is specified in
urn:schemas-upnp-org:device:*WANConnectionDevice*
one or more instances of which are specified under the device
urn:schemas-upnp-org:device:*WANDevice*

An instance of ***WANDevice*** is specified under the root device
urn:schemas-upnp-org:device:*InternetGatewayDevice*

The Service State Table (SST) of this service has dependencies on the ***WANPPPConnection*** service and must be used in the context of one or more ***WANPPPConnection*** instances.

NOTE: A ***WANDevice*** also provides a ***WANCommonInterfaceConfig*** service that encapsulates Internet access properties common across all WAN interfaces.

[*] Refer to companion documents defined by the UPnP Internet Gateway working committee for more details on specific devices and services referenced in this document.

2. Service Modeling Definitions

2.1. ServiceType

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

urn:schemas-upnp-org:service:*WANPOTSLinkConfig:1*.

2.2. State Variables

Table 1: State Variables

Variable Name	Req. or Opt.[1]	Data Type	Allowed Value	Default Value[2]	Eng. Units
ISPPhoneNumber	R	string	N/A	Empty string	N/A
ISPInfo	R	string	N/A	Empty string	N/A
LinkType	R	string	See table 1.1	*PPP_Dialup*	N/A
NumberOfRetries	R	ui4	>= 0	Not specified	N/A
DelayBetweenRetries	R	ui4	>= 0	Not specified	seconds
Fclass	O	string	Comma separated sub-strings indicating numbers 0, 1, 2, 2.0, 8, 80	Empty string	N/A
DataModulationSupported	O	string	See table 1.2	Empty string	N/A
DataProtocol	O	string	See table 1.3	Depends on specific modem	N/A
DataCompression	O	string	See table 1.4	Depends on specific modem	N/A
PlusVTRCommandSupported	O	boolean	1, 0	Not specified	N/A
Non-standard state variables implemented by an UPnP vendor go here.	*X*	*TBD*	*TBD*	*TBD*	*TBD*

[1] R = Required, O = Optional, X = Non-standard.

[2]Values listed in this column are required. To specify standard optional values or to delegate assignment of values to the vendor, you must reference a specific instance of an appropriate table below.

NOTE: Most default values are not specified in the DCP. A vendor may however choose to provide default values for SST variables where appropriate.

Table 1.1: AllowedValueList for `LinkType`

Value	Req. or Opt.
PPP_Dialup	*R*

Table 1.2: AllowedValueList for `DataModulationSupported`

Value	Req. or Opt.
V92	O
V90	O
V34	O
V32bis	O
V32	O

Table 1.3: AllowedValueList for `DataProtocol`

Value	Req. or Opt.
V42_LAPM	O
V42_MNP4	O
V14	O
V80	O

Table 1.4: AllowedValueList for `DataCompression`

Value	Req. or Opt.
V42bis	O
MNP5	O

2.2.1. ISPPhoneNumber

This variable specifies a list of strings separated by semicolon (;), each string representing a phone number to connect to a particular ISP. The digits of the phone number follow the semantics of the ITU E.164 specification. Delimiters such as brackets or hyphens between the digits of a phone number are to be ignored by the gateway. When the gateway receives an action request to initiate a connection, it will try each of these numbers sequentially starting from the first one to the last until a successful connection is made, or all the numbers are exhausted. For each phone number, upon a failed connection attempt the gateway will retry to connect as specified by the state variables `NumberOfRetries` and `DelayBetweenRetries`. This sequence will be interrupted if a connection termination action is received by the gateway (such as `ForceTermination` or `RequestTermination`). In this case the gateway will set the LastConnectionError state variable to ERROR_COMMAND_ABORTED and return ConnectionSetupFailed (704). If not interrupted, the gateway will return this error only if all the connection attempts fail. In this case the LastConnectionError state variable will be set to the appropriate RAS error received during the last failed connection attempt.

2.2.2. ISPInfo

This variable provides information identifying the Internet Service Provider. The format of the string is vendor specific.

2.2.3. LinkType

This variable indicates the type of POTS link used for the dialup connection.

2.2.4. NumberOfRetries

This variable specifies the number of times the gateway should attempt an Internet connection setup before returning error.

2.2.5. DelayBetweenRetries

This variable specifies the number of seconds the gateway should wait between attempts to setup an Internet connection.

2.2.6. Fclass

This variable specifies capabilities of the POTS modem – i.e., if it handles data (0), fax (1,2,2.0), voice (8), DSVD (80).

2.2.7. DataModulationSupported

This variable exposes the modulation standard used for data.

2.2.8. DataProtocol

This variable exposes the protocol standard for data transfers.

2.2.9. DataCompression

This variable exposes the compression technology implemented on the modem.

2.2.10. PlusVTRCommandSupported

This variable is used for full duplex operation with data and voice.

2.2.11. Relationships Between State Variables

The variables in the SST have no dependencies or relationship other than what is mandated by relevant POTS modem standards and protocols.

2.3. Eventing and Moderation

Table 2: Event Moderation

Variable Name	Evented	Moderated Event	Max Event Rate[1]	Logical Combination	Min Delta per Event[2]
ISPPhoneNumber	No	No	N/A	N/A	N/A
ISPInfo	No	No	N/A	N/A	N/A
LinkType	No	No	N/A	N/A	N/A
NumberOfRetries	No	No	N/A	N/A	N/A
DelayBetweenRetries	No	No	N/A	N/A	N/A
Fclass	No	No	N/A	N/A	N/A
DataModulationSupported	No	No	N/A	N/A	N/A
DataProtocol	No	No	N/A	N/A	N/A
DataCompression	No	No	N/A	N/A	N/A
PlusVTRCommandSupported	No	No	N/A	N/A	N/A
Non-standard state variables implemented by an UPnP vendor go here.	*TBD*	*TBD*	*TBD*	*TBD*	*TBD*

[1] Determined by N, where Rate = (Event)/(N secs).
[2] (N) * (allowedValueRange Step).

2.3.1. Event Model

None of the variables are evented.

2.4. Actions

Immediately following this table is detailed information about these actions, including short descriptions of the actions, the effects of the actions on state variables, and error codes defined by the actions.

Table 3: Actions

Name	Req. or Opt. [1]
SetISPInfo	O
SetCallRetryInfo	O
GetISPInfo	R
GetCallRetryInfo	R
GetFclass	O
GetDataModulationSupported	O
GetDataProtocol	O
GetDataCompression	O
GetPlusVTRCommandSupported	O
Non-standard actions implemented by an UPnP vendor go here.	X

[1] R = Required, O = Optional, X = Non-standard.

2.4.1. SetISPInfo

This action changes the value of variables used to dial up the ISP.

2.4.1.1. Arguments

Table 4: Arguments for SetISPInfo

Argument	Direction	relatedStateVariable
NewISPPhoneNumber	IN	ISPPhoneNumber
NewISPInfo	IN	ISPInfo
NewLinkType	IN	LinkType

2.4.1.2. Dependency on State (if any)

2.4.1.3. Effect on State (if any)

This action modifies variable values, which may be used in subsequent connection setups.

2.4.1.4. Errors

errorCode	errorDescription	Description
402	Invalid Args	One of following: not enough IN arguments, too many IN arguments, no IN argument by that name, one or more IN arguments are of the wrong data type. See also the UPnP Device Architecture.
501	Action Failed	May be returned in current state if service prevents invoking of that action.

2.4.2. SetCallRetryInfo

This action changes the number of retry attempts if connection setup failures are encountered.

2.4.2.1. Arguments

Table 5: Arguments for `SetCallRetryInfo`

Argument	Direction	relatedStateVariable
`NewNumberOfRetries`	*IN*	`NumberOfRetries`
`NewDelayBetweenRetries`	*IN*	`DelayBetweenRetries`

2.4.2.2. Dependency on State (if any)

2.4.2.3. Effect on State

None.

2.4.2.4. Errors

errorCode	errorDescription	Description
402	Invalid Args	One of following: not enough IN arguments, too many IN arguments, no IN argument by that name, one or more IN arguments are of the wrong data type. See also the UPnP Device Architecture.
501	Action Failed	May be returned in current state if service prevents invoking of that action.

2.4.3. GetISPInfo

This action retrieves values of state variables related to ISP configuration for activation of a connection.

2.4.3.1. Arguments

Table 6: Arguments for `GetISPInfo`

Argument	Direction	relatedStateVariable
`NewISPPhoneNumber`	*OUT*	`ISPPhoneNumber`
`NewISPInfo`	*OUT*	`ISPInfo`
`NewLinkType`	*OUT*	`LinkType`

2.4.3.2. Dependency on State (if any)

2.4.3.3. Effect on State

None.

2.4.3.4. Errors

errorCode	errorDescription	Description
402	Invalid Args	One of following: not enough IN arguments, too many IN arguments, no IN argument by that name, one or more IN arguments are of the wrong data type. See also the UPnP Device Architecture.

2.4.4. GetCallRetryInfo

This action retrieves values of state variables concerned with the activation of a connection.

2.4.4.1. Arguments

Table 7: Arguments for `GetCallRetryInfo`

Argument	Direction	relatedStateVariable
`NewNumberOfRetries`	*OUT*	`NumberOfRetries`
`NewDelayBetweenRetries`	*OUT*	`DelayBetweenRetries`

2.4.4.2. Dependency on State (if any)

2.4.4.3. Effect on State

None.

2.4.4.4. Errors

errorCode	errorDescription	Description
402	Invalid Args	One of following: not enough IN arguments, too many IN arguments, no IN argument by that name, one or more IN arguments are of the wrong data type. See also the UPnP Device Architecture.

2.4.5. GetFclass

This action queries modem capabilities.

2.4.5.1. Arguments

Table 8: Arguments for `GetFclass`

Argument	Direction	relatedStateVariable
`NewFclass`	*OUT*	`Fclass`

2.4.5.2. Dependency on State (if any)

2.4.5.3. Effect on State

None.

2.4.5.4. Errors

errorCode	errorDescription	Description
402	Invalid Args	One of following: not enough IN arguments, too many IN arguments, no IN argument by that name, one or more IN arguments are of the wrong data type. See also the UPnP Device Architecture.

2.4.6. GetDataModulationSupported

This action queries the modulation standard used for data.

2.4.6.1. Arguments

Table 9: Arguments for `GetDataModulationSupported`

Argument	Direction	relatedStateVariable
`NewDataModulationSupported`	*OUT*	`DataModulationSupported`

2.4.6.2. Dependency on State (if any)

2.4.6.3. Effect on State

None.

2.4.6.4. Errors

errorCode	errorDescription	Description
402	Invalid Args	One of following: not enough IN arguments, too many IN arguments, no IN argument by that name, one or more IN arguments are of the wrong data type. See also the UPnP Device Architecture.

2.4.7. GetDataProtocol

This action queries protocol standard used for data transfers.

2.4.7.1. Arguments

Table 10: Arguments for `GetDataProtocol`

Argument	Direction	relatedStateVariable
`NewDataProtocol`	*OUT*	`DataProtocol`

2.4.7.2. Dependency on State (if any)

2.4.7.3. Effect on State

None.

2.4.7.4. Errors

errorCode	errorDescription	Description
402	Invalid Args	One of following: not enough IN arguments, too many IN arguments, no IN argument by that name, one or more IN

		arguments are of the wrong data type. See also the UPnP Device Architecture.

2.4.8. GetDataCompression

This action queries the compression technology implemented on the modem.

2.4.8.1. Arguments

Table 11: Arguments for `GetDataCompression`

Argument	Direction	relatedStateVariable
`NewDataCompression`	*OUT*	`DataCompression`

2.4.8.2. Dependency on State (if any)

2.4.8.3. Effect on State

None.

2.4.8.4. Errors

errorCode	errorDescription	Description
402	Invalid Args	One of following: not enough IN arguments, too many IN arguments, no IN argument by that name, one or more IN arguments are of the wrong data type. See also the UPnP Device Architecture.

2.4.9. GetPlusVTRCommandSupported

This action queries capability for full duplex operation with data and voice.

2.4.9.1. Arguments

Table 12: Arguments for `GetPlusVTRCommandSupported`

Argument	Direction	relatedStateVariable
`NewPlusVTRCommandSupported`	*OUT*	`PlusVTRCommandSupported`

2.4.9.2. Dependency on State (if any)

2.4.9.3. Effect on State

None.

2.4.9.4. Errors

errorCode	errorDescription	Description
402	Invalid Args	One of following: not enough IN arguments, too many IN arguments, no IN argument by that name, one or more IN arguments are of the wrong data type. See also the UPnP Device Architecture.

2.4.10.Non-Standard Actions Implemented by a UPnP Vendor

To facilitate certification, non-standard actions implemented by UPnP vendors should be included in this service template. The UPnP Device Architecture lists naming requirements for non-standard actions (see the section on Description).

2.4.11.Relationships Between Actions

Other than the paring of Get and Set actions, these actions have no specific relationships between them.

2.4.12.Common Error Codes

The following table lists error codes common to actions for this service type. If an action results in multiple errors, the most specific error should be returned.

Table 13: Common Error Codes

errorCode	errorDescription	Description
401	Invalid Action	See UPnP Device Architecture section on Control.
402	Invalid Args	See UPnP Device Architecture section on Control.
404	Invalid Var	See UPnP Device Architecture section on Control.
501	Action Failed	See UPnP Device Architecture section on Control.
600-699	TBD	Common action errors. Defined by UPnP Forum Technical Committee.
701-799		Common action errors defined by the UPnP Forum working committees.
800-899	*TBD*	*(Specified by UPnP vendor.)*

2.5. Theory of Operation

A ***WANConnectionDevice*** that has a POTS modem interface MAY implement the ***WANPOTSLinkConfig*** service. The SST variables in this service give information on specific properties of a POTS modem used for WAN Internet access.

3. XML Service Description

```
<?xml version="1.0"?>
<scpd xmlns="urn:schemas-upnp-org:service-1-0">
  <specVersion>
    <major>1</major>
    <minor>0</minor>
  </specVersion>
  <actionList>
    <action>
    <name>SetISPInfo</name>
      <argumentList>
        <argument>
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