
CT-Bridge

Interface Description

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Versions	3
Abbreviations	3
Introduction / Purpose.....	4
Architecture.....	4
Model	5
Conference	5
Functionality.....	5
Call states	5
IDs	5
Functions.....	6
lineInitialize	6
lineOpen	6
lineMakeCall	6
lineAnswer	6
lineDial.....	6
lineDrop	6
lineGenerateDigits	6
lineHold.....	6
lineUnhold.....	6
linePickup	6
lineRedirect.....	6
lineForward.....	7
lineSetupTransfer	7
lineCompleteTransfer	7
lineBlindTransfer.....	7
lineSetAgentGroup	7
lineSetAgentState.....	7
lineSetupConference.....	7
lineAddToConference.....	7
lineClose.....	7
Dynamic creation / destruction.....	8
Extensions.....	8

Versions

Version	Date / Author	Changes
1.0	18.06.2013 / M. Roth	Initial Version
3.0	27.01.2014 / M. Roth	Changes for SIP link integration

Abbreviations

PBX	Private Branch Exchange
TAPI	Telephony Application Programming Interface
CCT	Communication Control Toolkit, provided by Avaya
AACC	Avaya Aura Call Center (Successor of CCT)

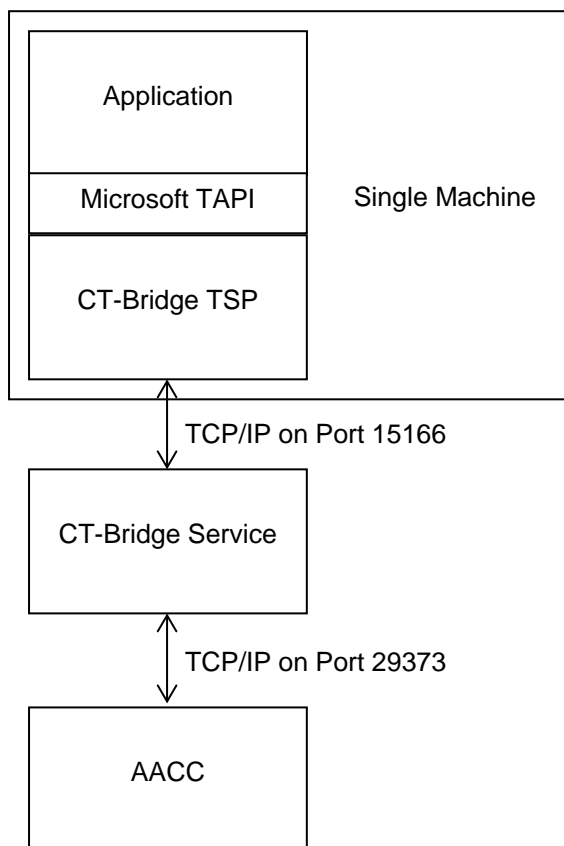
Introduction / Purpose

This document describes the interface of the CT-Bridge Telephony Service Provider (TSP). This interface is indirectly used by applications that implement Microsoft's Telephony Application Programming Interface (TAPI). Even though TAPI is a standard, the flow of call states and the availability of features is up to the TSP / PBX.

This document's intended audience are application developers with a good knowledge in TAPI.

Architecture

CT-Bridge consists of two parts: The TSP installed on the application PC and the CT-Bridge Service. It is recommended that the Service is installed on the AACC Server in order to minimize network traffic (especially for installations with more than 1000 calls per hour).



The TSP is intended as a 3rd party TSP, i.e. it provides control for a number of lines. 3rd Party TSPs are commonly used by CTI applications with a client-server architecture.

However, it is also possible to use CT-Bridge in a 1st Party environment. In this case both the TSP and the Service are installed on the client PC. Each TSP is configured with its own CCT credentials in order to control a specific single line. Such a configuration is not desirable for large installations due to heavy, lag sensitive traffic on the network.

The AACC can connect to the PBX through an AML or SIP interface.

Model

The TSP models a phone (TN) as a TAPI line, a key on the phone (DN) as a TAPI address. One or two keys may be configured per phone.

Conference

A conference call is modelled as a single call with state LINECALLSTATE_CONFERENCED. An application does not know how many parties are present.

Functionality

For Version 1, CT-Bridge strived for complete compatibility with Nortel's Symposium TSP. Since then however many additions and changes have been made and compatibility can no longer be guaranteed.

Call states

The TSP sends notifications for the following call states:

- LINECALLSTATE_IDLE
- LINECALLSTATE_DIALING: When a call is placed but is not yet ringing on the remote side.
- LINECALLSTATE_RINGBACK: When a call is placed and rings on the remote side.
- LINECALLSTATE_OFFERING: Incoming call is ringing.
- LINECALLSTATE_DISCONNECTED: The remote party has hung up.
- LINECALLSTATE_CONNECTED
- LINECALLSTATE_BUSY
- LINECALLSTATE_HOLD
- LINECALLSTATE_HOLDPENDTRANSFER: signalled after lineSetupTransfer
- LINECALLSTATE_HOLDPENDCONFERENCE: signalled after lineSetupConference
- LINECALLSTATE_CONFERENCED: Call is in a conference.

Call state changes may occur at any time.

IDs

The TSP fills in the fields

- CallerID
- CalledID
- RedirectingID
- RedirectionID

The CCT provides the IDs CallerID, CalledID and OriginalDestination. These are mapped to the above IDs according to the TSPs settings, which can be altered in the GUI.

The IDs are set after LINE_CALLSTATE notifications are sent. If IDs are changed, a LINECALL_INFO message is sent.

Functions

lineInitialize

The TSP stores the number of lines (and their names, addresses, etc.) in the registry. The `lpdwNumDevs` parameter of the `lineInitialize(Ex)` function will therefore contain the last known number of devices available for the specified user on the CCT (plus of course devices from other TSPs).

lineOpen

When the first line gets opened, the TCP link to the CCT gets connected. This may take a few seconds. For each line the TSP will report currently present calls and their states.

When a line is opened, the TSP first checks if enough licences are available. If all licences are in use, `LINEERR_RESOURCEUNAVAIL` is returned.

lineMakeCall

`lineMakeCall` must provide a destination number. This number can be in canonical or dialable format. An application may use `CallParams` to specify on which address the call should be made (`dwAddressMode = LINEADDRESSMODE_ADDRESSID` and `dwAddressID = 0` or `1`).

lineAnswer

Answer an incoming call.

lineDial

Is used after calling `lineSetupTransfer` or `lineSetupConference`, in order to dial the number on the newly created call.

lineDrop

Drop a call.

lineGenerateDigits

Send DTMF digits.

lineHold

Put a call on hold. The held call may not be used for transfers or conferences.

lineUnhold

Retrieve a held call. May also be used for calls with the states `_HOLDPENDTRANSFER` and `_HOLDPENDCONFERENCE` (brokering).

linePickup

Answer a call ringing on another line. Only directed pickup is supported: `lpzDestAddress` must contain the number on which the call is ringing.

Is not supported with SIP links.

lineRedirect

Redirect a `_OFFERING` call to a different address.

Is not supported with SIP links.

lineForward

Set call forwarding on the line. Only the first entry in the LINEFORWARDLIST is executed. Possible LINEFORWARDMODES are:

- `_UNCOND`
- `_BUSY`
- `_NOANSW`

Use this function with an empty list to clear all forwarding instructions.

When forwarding changes, the TSP sends a `LINE_ADDRESSSTATE` message with `LINEADDRESSSTATE_FORWARD`. This also happens when the forwarding instructions change by user input.

Is not supported with SIP links.

lineSetupTransfer

Create a new consultation call for a monitored or supervised transfer. `lineDial` must be used to dial the consultation party's number.

An application may also specify the `LINECALLPARAMFLAGS_ONESTEPTRANSFER` flag in the `CallParams`. The TSP then expects the destination's party in the `targetAddress` field.

lineCompleteTransfer

Complete a transfer initiated by `lineSetupTransfer`.

lineBlindTransfer

Transfer a call without a consultation call.

lineSetAgentGroup

Used to log in an agent in a call center environment. May only be used on agent lines. The first entry in the `LINEAGENTGROUPLIST` must contain the `AgentID`.

lineSetAgentState

Possible states are:

- `LINEAGENTSTATE_READY` (ACD-Calls will be presented at this terminal)
- `LINEAGENTSTATE_NOTREADY`
- `LINEAGENTSTATE_LOGGEDOFF`

Changes made through this function or through manual user actions cause a `LINE_AGENTSTATUS` message.

lineSetupConference

Create a new consultation call for a conference. `lineDial` must be used to dial the consultation party's number.

lineAddToConference

Can be called as soon as the consultation call is in the `_CONNECTED` state. The consultation call has to be created through a call to `lineSetupConference`.

lineClose

Frees up a license. When the last line is closed, the TCP link to the CCT is shut down.

Dynamic creation / destruction

CT-Bridge supports the dynamic creation and destruction of TAPI lines.

As soon as a TN is assigned to the CT-Bridge user in the CCT configuration and this TN has one or two DNS assigned, the TSP will send a LINE_CREATE message.

When a TN is disabled in the CCT configuration, a LINE_CLOSE message is sent, followed by a LINE_REMOVE message. An application must call lineClose on the line.

When no lines are open, the TSP will not be informed about lines created/destroyed, as the TCP link to the CCT is not connected.

Extensions

CT-Bridge does not support the lineDeviceSpecific function.

Agent state changes cause a LINE_DEVSPECIFIC message. Parameter3 contains the agent state.