

SAPi.net

Software Development Kit (SDK)



ImpleoTV

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Revision Sheet

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Executive Summary

SAPI is a simple but powerful platform for applications that need to capture and process the SAP announcements on the LAN. SAPI SDK is written using the C# programming language and can run on PCs with .Net Framework 2.0 or later installed.

Developers use the SAPI software developer kit (SDK) to create multimedia applications. The SDK is released under the ImpleoTV EULA (End User License Agreement). The SAPI SDK allows quick development of applications that need access to SAP / SDP info. Built entirely on the Microsoft .NET platform, it is radically easier the integration process. This paper describes several usage scenarios as well as brief tutorial and some code samples.

Features at a Glance

Functionality

- SAP announcements capture and SDP information extraction
- Configurable SAP multicats IP and Port (not only default 224.2.127.254 and 9875)
- Configurable session expiration timeout
- Listener NIC selection

.Net Technology

- .Net 2.0 Framework or greater.
- Written entirely in managed code (C#)
- Sample C# code
- Easy integration with any .Net language - C#, Managed C++, VB, etc.

Application development

- Very easy integration (just a few lines of code)
- Console application Sample code
- WPF Demo application
- Intellisense support

Installation and deployment

- Easy to install package
- Simple xcopy deployment
- Royalty free redistribution

Introduction

Using SAPI SDK is quick and easy. In general, in order to capture SAP/SDP messages transmitted over LAN, the SAP listener object needs to be created and Start method called. For many applications, the desired functionality can be accomplished with as few as 5 lines of code, and the SAPI module takes care of the rest.

Architecture

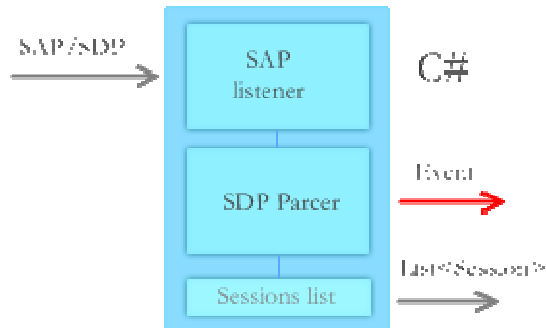


Figure 1. SAP Listener Block Diagram.

SAP listener has been implemented in C#. There are two classes that provide SAP and SDP protocol implementation as defined by corresponding RFCs ([1] and [2]). SAP module is responsible for capture and parsing of the packets coming from the network and SDP module – for data parsing and processing. Some auxiliary components provide the functionality for data sorting and event notification.

Programmer's guide

Getting started

To install SAPI SDK for .Net, your computer should be equipped with the following:

- Microsoft® Windows® XP, Windows Server® 2003 or Windows Vista®.
- .Net 2.0 Framework for using SAPI
- .Net 3.5 Framework for using SAPI WPF demo application

Installing SAPI

1. Download SAPI SDK installer from www.impleotv.com
2. Double-click the downloaded installer **setup.exe**
3. Follow the instructions on the screen to complete the installation.

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NOTE: SAPI SDK requires the .NET 2.0 Framework. If the .NET Framework is not detected during installation, you will be prompted to install it. Click Install .NET to continue. The Windows Installer will be installed, followed by the .NET framework.

Installed Modules

- SAPI SDK. SAPI module delivered in a form of .Net assembly – SAPI.dll with the corresponding SAPI.xml (intellisense file).
- SapiTest.exe – Console Test application
- SAPIWpfDemo.exe – WPF demo application
- Console application sample code

Using SAPI

The SDK provides examples of applications using SAPI. These examples may contain only the executable files and are provided for illustrative purposes only. Some however, contain source code. You are free to model applications on these samples. Since SDK samples are meant to demonstrate basic use scenarios, not all options or contingencies are checked. Additionally, error conditions may not always be checked as thoroughly as robust applications should.

The code of SapiTest application shows possible usage scenarios. Actually, there are two basic modes, the simplest one, with default settings and the advanced one, where all the important setting may be altered.

Configurable parameters.

SapListener allows configuration of the following parameters:

NicAddress	Network interface IP address. Network interface SAPI will receive SAP packets from. If not set, a first network interface found will be used.
IP	Multicast IP for SAP announcements If not set, a default 224.2.127.254 value will be used.
Port	Port for SAP announcements If not set, a default 9875 value will be used.
Timeout	A session announcement message should be received periodically for each session description in a receiver's session cache. The announcement period can be predicted by the receiver from the set of sessions currently being announced. If a session announcement message

	has not been received for Timeout (in sec) announcement period, the session is deleted from the receiver's session cache. If not set, a default 60 sec value will be used.
--	--

Table 1. Parameters description.

Sample code.

Below is a sample code that shows actions that should be taken in order to activate the Sap Listener. In this scenario SAP listener will be configured with default and the `SapListenerEventHandler` event handler will be called when new session is received.

```
using SapListener;

namespace SapiTest
{
    class Program
    {
        static void Main(string[] args)
        {
            Console.WriteLine("Start SAP listener");
            try
            {
                //Crate listener instance
                SAPlistener listener = new SAPlistener();

                //Setup event handler
                listener.SapChanged += new
                    SapEventHandler(SapListenerEventHandler);

                //Start listening.
                listener.Start();

                // Wait to abort
                Console.ReadLine();

                //Stop listening
                listener.Stop();
            }
            catch (Exception ex)
            {
                Console.WriteLine("Error - {0}", ex);
            }
            Console.WriteLine("Exiting SAP listener...");
        }

        //This function will be called when some SAP listener event occur
        static void SapListenerEventHandler(object sender, SapEventArgs e)
        {}
    }
}
```

Table 2. Sample code.

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If there is a need to change default parameters, it may be done as shown below. The settings actually put the same default parameters as the module is preconfigured - the SAPI is told to listen on the 1st network interface found on the system, join the default multicast group and port, and delete sessions from the session list if there is no corresponding announcement for 60 sec.

```
//Configure listener (optional, only if some non
//default parameters should be applied)

// Find NIC IP
string strHostName = Dns.GetHostName();
IPHostEntry ipEntry = Dns.GetHostByName(strHostName);
IPAddress[] addr = ipEntry.AddressList;

//Listen to the first NIC
listener.NicAddress = addr[0].ToString();

//Set SAP announce IP and port (here are the default values)
listener.IP = "224.2.127.254";
listener.Port = "9875";

//Set Timeout
listener.Timeout = "60";
```

Table 3. Using SAPI Properties for optional params setup.

SAPI stores the captured announcements in the Session List. As shown below, a session has the unique **Id**, **SDP** string and **LastTimeReceived** time stamp properties.

```
// Class Session represents the SDP session information captured by the
// listener.
public class Session : IEquatable<Session>
{
    //Property Id Unique session descriptor Id.
    public string Id { get; set; }

    //Property SDP String containing the SDP descriptor.
    public string SDP { get; set; }

    //Property LastTimeReceived DateTime when the session has
    //been//received.
    public DateTime LastTimeReceived { get; set; }
}
```

Table 4. Session class.

In order to access the Session information, `GetSessionById` or `GetSessions` methods may be used.

```
static void SapListenerEventHandler(object sender, SapEventArgs e)
{
    switch(e.SapEvent)
    {
        case SapEvent.NewSessionFound:
            Console.WriteLine("\rSap session {0} has been added.
{1} ", e.Id, DateTime.Now.ToString());
            break;

        case SapEvent.SessionDeleted:
            Console.WriteLine("\rSap session {0} has been
deleted. {1} ", e.Id, DateTime.Now.ToString());
            break;
    }

    //Get the session that caused the event
    Session s = ((SAPlistener)sender).GetSessionById(e.Id);
    Console.WriteLine(s.SDP);

    //Get array of the SDP
    string[] ar = ((SAPlistener)sender).GetSessions();
    Console.WriteLine("Current items [{0}]: \n",
ar.Length.ToString() );

    //Print all SDP sessions
    foreach( string Sdp in ar )
        Console.WriteLine("{0}\n", Sdp);
}
```

Table 5. Accessing session information

Error handling

SapListener throws exceptions in case of non applicable parameters or internal error, so the try/catch statements should be used.

Test Application

Console test application

SapiTest.exe demo application provides basic functionality and demonstrates a general SAPI SDK use. Its code may be found as a part of the installation package.

WPF test application

SAPiWpfDemo.exe is a more advanced sample application built using SAPI SDK. It provides full control over the SAPI parameters.

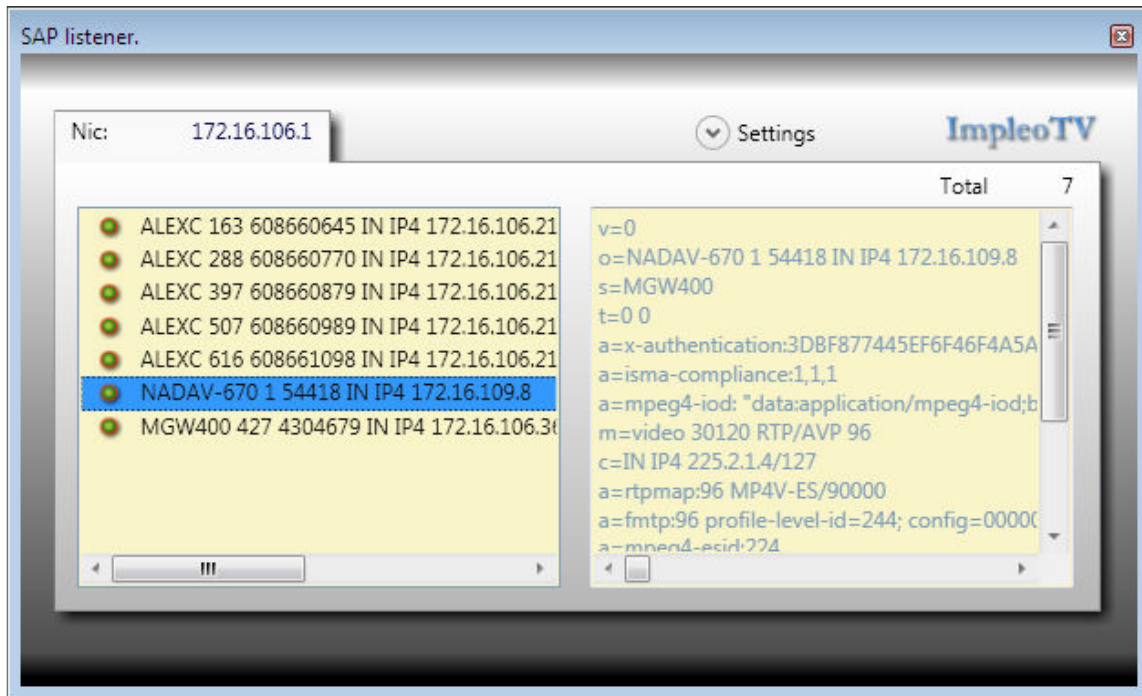


Figure 2. SAP listener WPF test application.

Acronyms and Abbreviations

For the purposes of this document, the abbreviated terms given in the following list apply:

SAP	Session Announcement Protocol
SDP	Session Description Protocol

REFERENCES

- [1] RFC 2327 (RFC2327) SDP: Session Description Protocol
- [2] RFC 2974 (RFC2974) SAP: Session Announcement Protocol