



An Overview of Windows® Embedded NavReady™ 2009 Features

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Summary: Windows Embedded NavReady 2009 provides OEMs with the technology to create handheld portable navigation devices (PNDs) with smart, innovative features. This white paper provides an overview of the features and services available in NavReady 2009.

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Introduction

This white paper provides introductory information on the Windows Embedded NavReady 2009 features that are developed using Windows CE 5.0 Platform Builder.

In June 2008, Microsoft released the first version of NavReady that is geared toward device makers of portable navigation devices (PNDs). NavReady includes an architecture that enables PND OEMs to build a number of innovative features, including location-aware services, data connectivity, and a desktop PC Gadget display, called Microsoft SideShow.

Each of the NavReady features allows the PND OEM to provide customized, value-added features which can be used to differentiate OEM platforms and enhance the user experience in key interest areas. NavReady features are available as Windows Embedded CE 5.0 Platform Builder components for inclusion via the Catalog. Alternatively, NavReady ships with a PND device template that allows OEMs a starting point to develop devices that include the NavReady features. The following figure shows the high-level architecture of a NavReady-powered device.

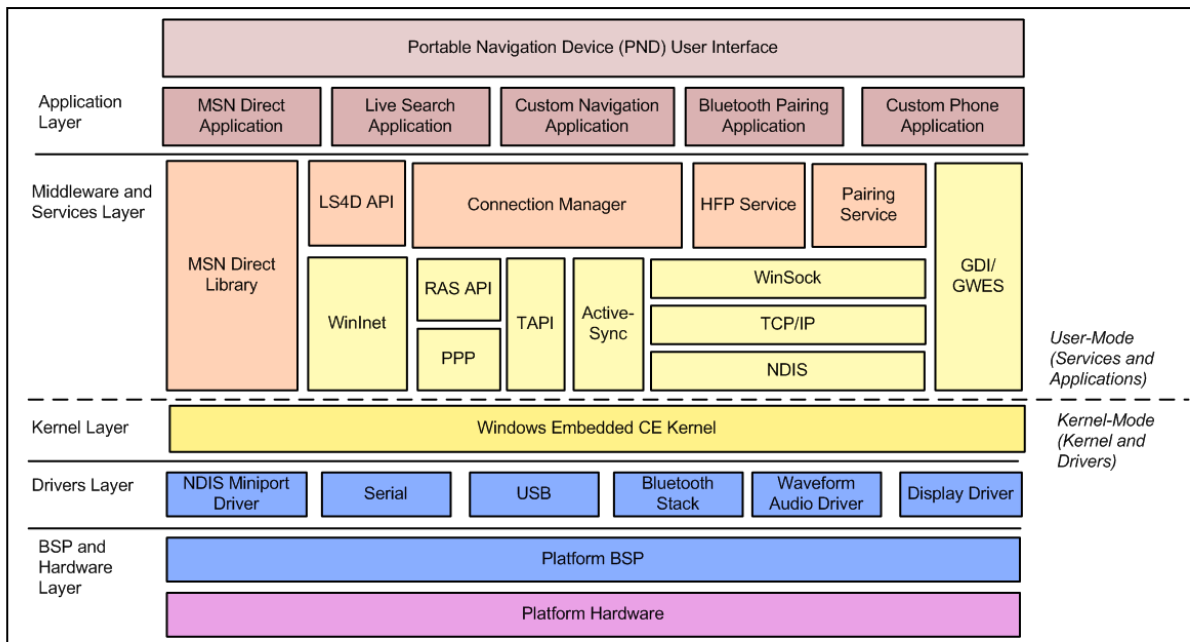


Figure 1 – High level architecture of NavReady2009

Location-Aware Services

Personal navigation is a growing market and customers have come to expect more than simple maps or GPS locations. New services, such as searchable points of interest (POI) and up-to-date local information, including traffic and weather, are key features that consumers expect. NavReady 2009 provides a stable, centralized framework for OEMs

to enhance their devices with these new features in an implementation- specific way by using two location-based service components: Live Search for Devices (LS4D) and MSN Direct Services.

The Live Search for Devices online service can be used to provide consumers with up-to-date, relevant location-aware POI that are extracted from online phone books for Yellow Pages (business listings) or White Pages (residential listings). Users will be able to enter keywords to search for POI and get results that are based on the user’s current location. The search results will include information for display by the navigation application, such as nearby business names, addresses, phone numbers, and user ratings for businesses. Additionally, the navigation application can leverage the LS4D results to provide turn-by-turn directions to a given destination. The user interface (UI) for the Live Search application is implementation-specific, which allows the OEM to differentiate themselves with current and relevant data from Windows Live Search.

The following figure shows how the LS4D online service is made up of a number of components, both on and off the Windows Embedded device.

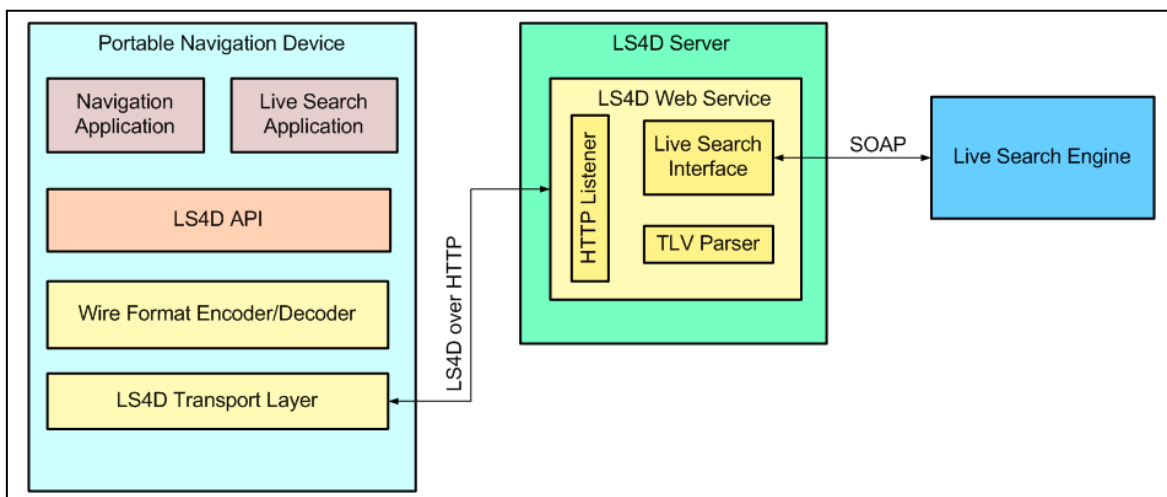


Figure 2 – LS4D System Architecture Components

Note that Live Search for Devices (LS4D) applications must adhere to the Live Search UI Guidelines specified at this Microsoft Web site:

<http://msdn.microsoft.com/en-us/library/cc510757.aspx>

In addition to LS4D, Microsoft’s MSN Direct Service is available as a NavReady 2009 component, allowing the PND to provide users with locale-specific, up-to-date data such as traffic reports, gas prices, weather reports and forecasts, movie times, local events, stock quotes, news headlines, emergency alerts, and received locations sent from the desktop. MSN Direct is currently available in over 125 major regions in the U.S. and Canada. MSN Direct data is distributed via a special sub-carrier band in the FM channel and is transmitted through FM radio towers, as shown in the following figure.

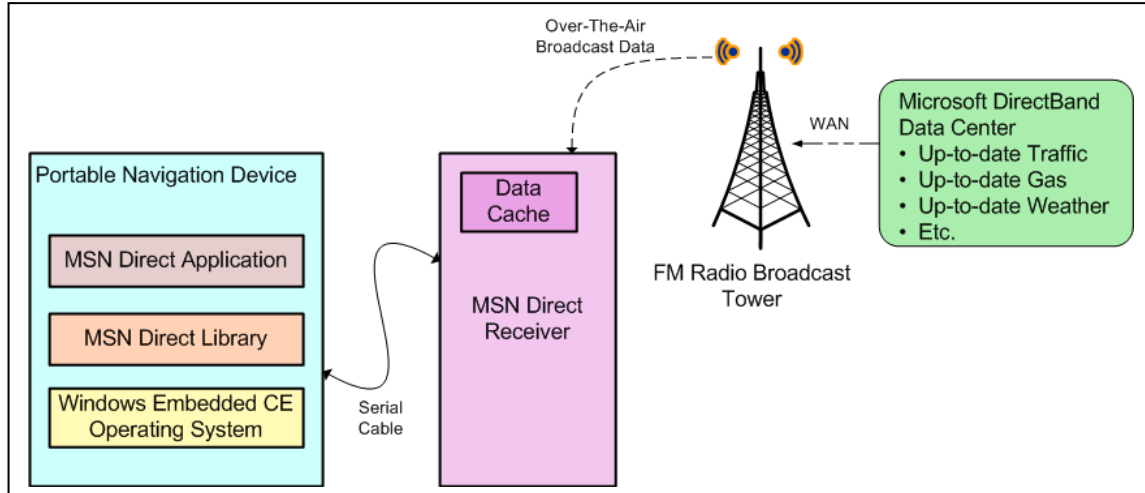


Figure 3 – MSN Direct Service High Level Architecture

Information available from the MSN Direct Service can greatly enhance consumer satisfaction on PNDs. Instead of giving the fastest or shortest route to a destination, the PND's navigation engine can provide up-to-the-minute traffic conditions and alter the driving route, if necessary, in real-time. The various types of information broadcast by the MSN Direct Service provide new opportunities to aid and enhance a user's driving and navigation experience.

The possibilities of new, enhanced user features for the PND class of device make MSN Direct a welcome new feature for Windows Embedded CE devices.

Data Connectivity

A new, key feature of portable navigation devices (PNDs) is the ability to connect with other devices to exchange data, make hands-free phone calls, or stream media. Windows Embedded CE has a number of different technologies available for interconnecting with other devices, such as Bluetooth and ActiveSync. However, key features required for PND, as well as management of data connections, are not present in baseline Windows Embedded CE 5.0. Prior to Windows Embedded NavReady 2009, there was no support for Bluetooth features, such as the new Bluetooth Hands-Free Profile (HFP) and Advanced Audio Distribution Profile (A2DP), as well as no centralized data-connectivity management. NavReady 2009 includes new Bluetooth profiles as well as a Connection Manager to enable these features. Utilizing additional Bluetooth profiles allows the PND to enable new and creative user experiences.

Bluetooth[®] Enhancements

Bluetooth technology is not a new feature in Windows Embedded CE. However, NavReady introduces a number of new Bluetooth profiles specifically for PNDs and their unique connectivity needs. The new profiles include the following:

- **Hands-Free Profile (HFP):** Helps enable the PND to make and receive hands-free voice calls with a paired mobile phone.
- **Dial-up Networking (DUN) Profile:** Helps enable Internet connectivity using a paired device containing a wireless modem, such as a mobile phone with data connectivity.
- **Phone Book Access Profile (PBAP):** Helps enable access to the address book on a paired mobile phone.
- **Advanced Audio Distribution Profile (A2DP):** Helps enable streaming audio to a paired audio device, such as an in-car stereo.
- **Audio/Video Remote Control Profile (AVRCP):** Helps enable a paired multimedia control device, such as an in-car stereo, to control audio/video playback.

These Bluetooth profiles allow the PND to support exciting new features, leveraging other devices the consumer already has. For example, with NavReady 2009 the navigation application can access the user's address book on a mobile phone to get a friend's address in order to provide detailed directions from the user's current location. The new Bluetooth profiles build on the existing Windows Embedded CE Bluetooth stack. The following figure shows how the PBAP profile and paired mobile phone work together.

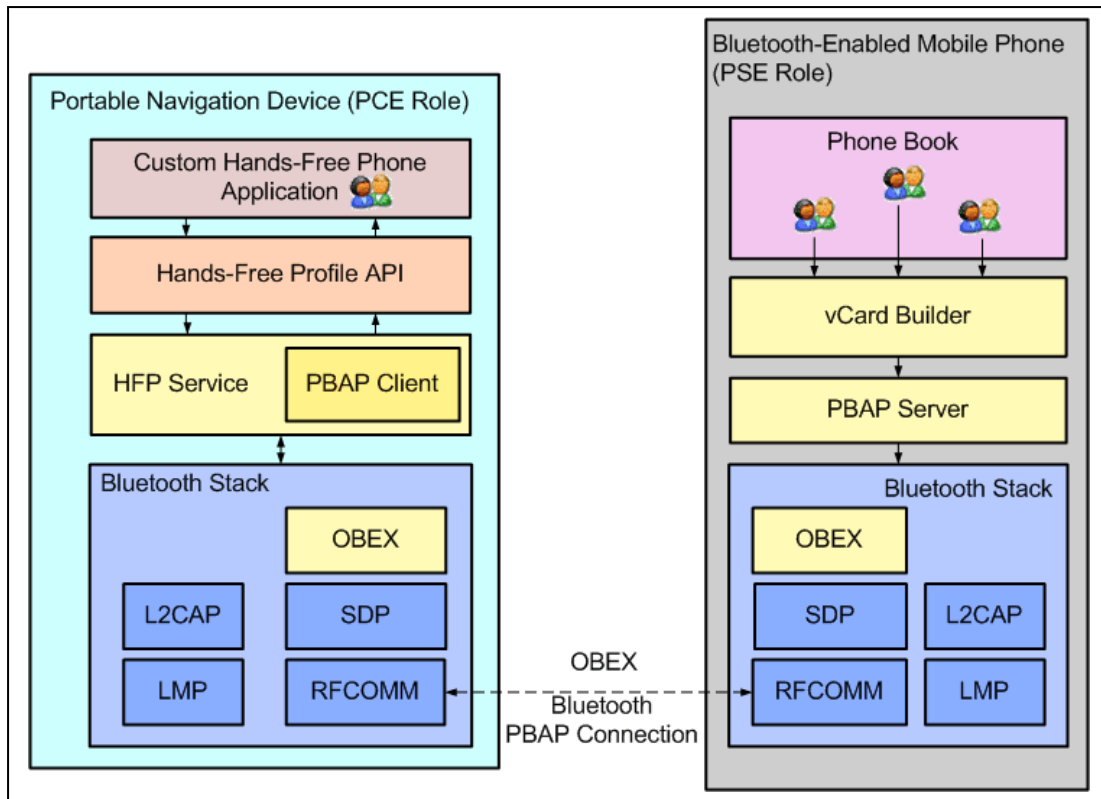


Figure 4 -PBAP Software Architecture

Each new profile provides numerous features for OEMs to enhance their devices. Additionally, Microsoft has tested the NavReady Bluetooth profiles with more than 100 different handsets, demonstrating the reliability and compliance of the NavReady features with existing products.

Connection Manager

The Connection Manager component of NavReady 2009 provides a centralized manager for selecting and establishing different types of network connections. Connection Manager is capable of handling a number of different connections, including voice calls using Bluetooth hands-free capability, Internet connectivity using Bluetooth Dial-up Networking (DUN), or an ActiveSync Desktop Pass-through (DTPT) connection. The Connection Manager architecture provides an API for connected applications to request connectivity while it manages the selection and processing of the ideal connection. The following figure is a high-level architecture drawing of a PND utilizing Connection Manager.

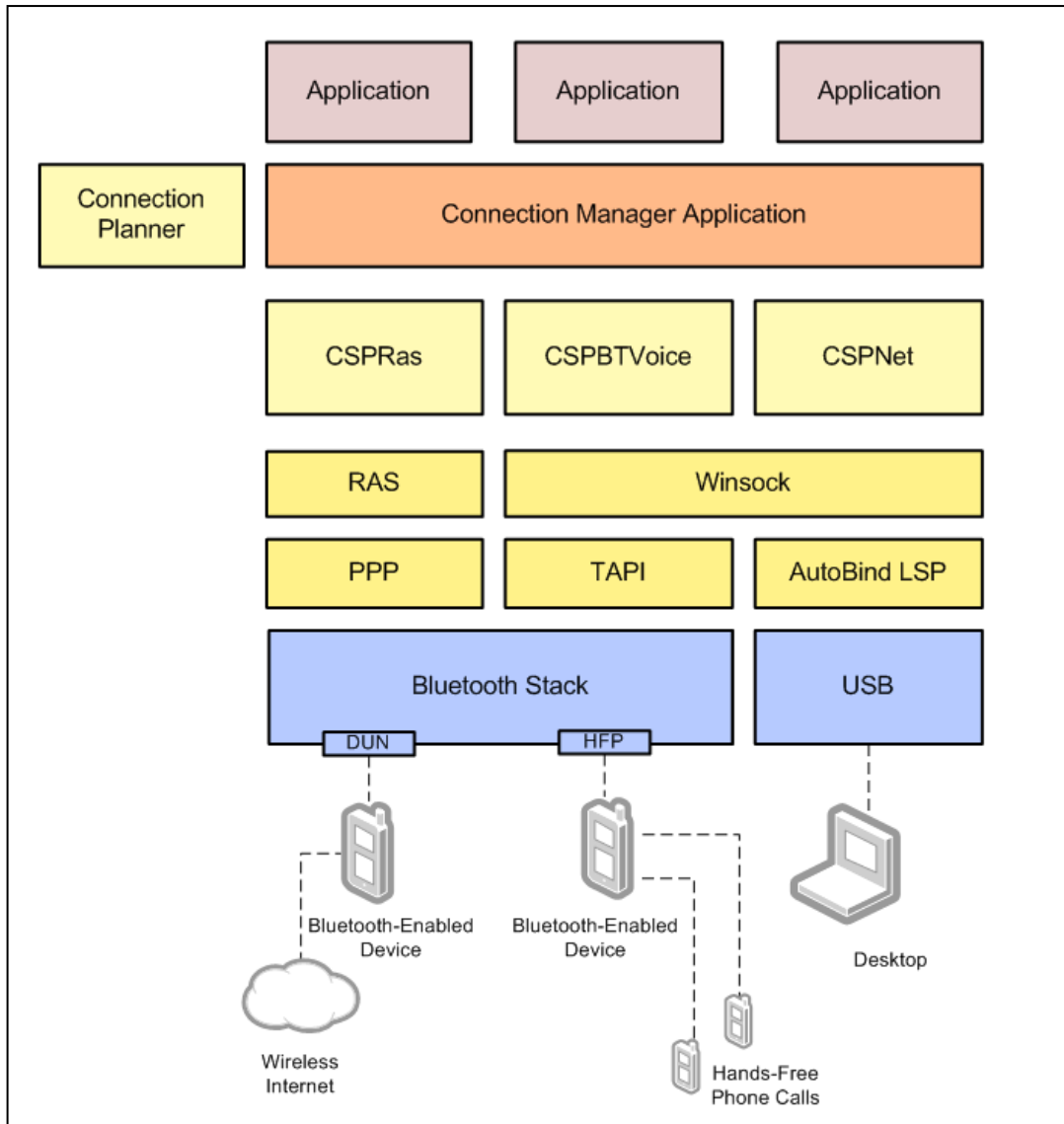


Figure 5 – Connection Manager Software Architecture

Connection Manager is more than a simple method to request a connection. Connection Manager includes a scheduler for establishing connections at pre-defined times as well as handling multiple connection requests with different priorities and security levels. Built into the scheduler are optimizations for reducing duplicate network connections as well as establishing the best network connection for the application. This flexibility allows applications to use network resources at set intervals instead of establishing simultaneous, redundant connections. Connection Manager’s handling of the optimal transport reduces the complexity of the PND’s applications allowing them to use a desired network-resource type without having to know the details.

ActiveSync Desktop Pass-through (DTPT)

NavReady 2009 includes Desktop Pass-through (DTPT), via ActiveSync, to provide network connectivity to the PND. This technology allows the PND to leverage the networking capabilities of a desktop PC to access the Internet. With Internet access the PND can then access Internet applications and services such as Live Search or detailed maps.

DTPT on the Windows Embedded CE device works in conjunction with a DTPT server running on the desktop in order to provide network connectivity. The Windows Embedded CE device, or DTPT client, has full network connectivity between itself and the host desktop PC. However, traffic to external hosts is restricted to only TCP/IP traffic via the DTPT server on the host desktop PC. On the Windows Embedded CE device, the DTPT client connection appears to be a normal network adapter providing TCP/IP access.

Users can perform a Live Search on a PND to create detailed, mapped directions to a specific destination. The PND is paired via Bluetooth with a mobile phone which has data capabilities but is currently connected to a desktop PC with DTPT support. Connection Manager automatically selects the best network connection, likely the DTPT depending on the OEM configuration, for submitting the Live Search and pulling the latest online maps. The Live Search is performed using LS4D over the DTPT link with the latest Point of Interest (POI) data from online sources and turn-by-turn directions generated for users to follow.

Microsoft SideShow

Microsoft SideShow is a unique feature first released as part of Windows Vista. SideShow provides a way to display information including email messages, appointments, and other information from the computer, on a "companion" device. The SideShow-enabled computer runs one or more gadgets which send data to attached client devices. NavReady 2009 includes support for the SideShow architecture, allowing OEMs to enable SideShow content within the PND which is tailored for the device's features.

SideShow support within NavReady 2009 allows the OEM to display SideShow Gadget content on the device. The SideShow architecture for Windows Embedded CE handles the connection with the SideShow server running on the Microsoft Windows Vista computer as well as sending and receiving the actual SideShow data. The connection with the Microsoft Windows Vista computer can be via Bluetooth, USB, or IP transports. The transport itself is managed entirely by the SideShow service with no interaction from the PND applications. The SideShow service supports multiple PND applications utilizing the service simultaneously. This allows OEMs to create a feature-rich platform with support for numerous next-generation features from existing or custom SideShow Gadgets. These gadgets are available at <http://gallery.live.com/default.aspx?pl=7>. The following figure illustrates the SideShow architecture.

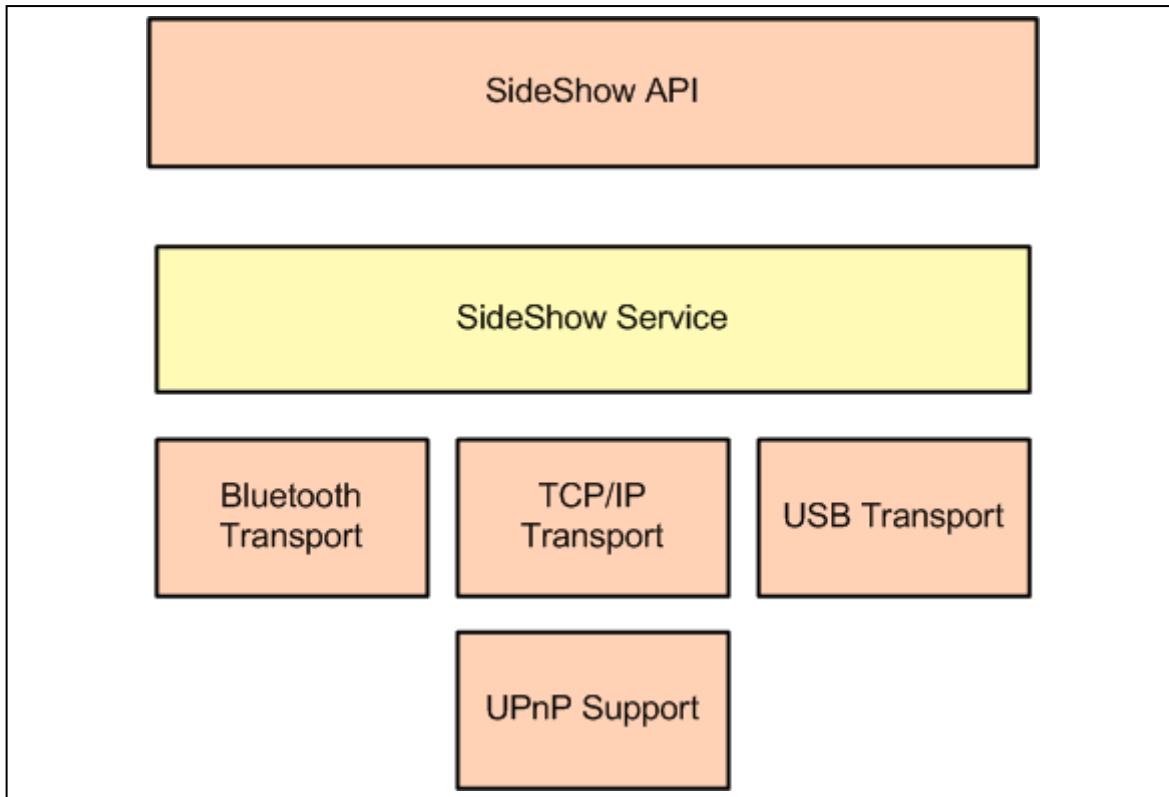


Figure 6 – SideShow Software Architecture

The SideShow component includes the API, SideShow service, and supported transports. While multiple transports are included, SideShow supports only one transport mechanism at a time. However, changing the transport only requires a simple registry change and a reboot of the Windows Embedded CE device. It should also be noted that SideShow's USB transport and the ActiveSync Desktop Pass-through (DTPT), used by the Windows Embedded NavReady 2009 Connection Manager, can both be installed on the device but cannot be used at the same time. SideShow for Windows Embedded CE does not include a user interface; OEMs must create any required UI applications. This allows the OEM to integrate SideShow's features into the platform's customized, feature-rich theme.

Using SideShow, OEMs can display Gadgets from a Windows Vista computer on the PND and make extensive information available through SideShow Gadgets.

Integrating NavReady 2009

NavReady 2009 is available for deployment on Windows Embedded CE 5.0-based devices. Because of Windows Embedded CE 5.0's maturity in the market, NavReady 2009 is available via the Platform Builder Catalog as well as via a platform template.

This flexibility for deployment ensures that NavReady can be leveraged by both existing and new product offerings. Note that NavReady is only available for ARM-based devices at this time.

OEMs with existing devices running Windows Embedded CE 5.0 can utilize NavReady by selecting the desired components from the Catalog and adding them to the platform. The platform image will need to be rebuilt to include the new NavReady components. This flexible method of deployment allows devices already in the market or near production with PND functionality to take advantage of NavReady's powerful additions without starting the platform definition from scratch.

For OEMs creating new devices, NavReady 2009 includes a PND design template available in the New Platform Wizard. The PND design template provides a starting point for new devices that will include all of the advanced features available from NavReady. This includes Bluetooth profiles, ActiveSync, location-based services, and the other key features described in this white paper. As always, after creating the initial design using the New Platform Wizard, an OEM can further customize the platform image by adding additional components from the Catalog.

Conclusion

The PND market is one of the fastest growing global markets. From the OEM perspective, it's also one of the most competitive. OEMs must develop new features and services to differentiate themselves from competitors. Windows Embedded NavReady 2009 provides some of the most advanced technologies and services from Microsoft, enabling OEMs to create many compelling and exciting PND connection experiences for their customers.

For more information:

Windows Embedded Web site:

<http://www.microsoft.com/windows/embedded/default.aspx>

Windows Embedded NavReady 2009 Web site:

<http://msdn.microsoft.com/en-us/library/cc510895.aspx>