S60 Platform: Introductory Guide

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S60 platform

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Change history

February 14, 2005	Version 1.0	Initial document release
November 9, 2005	Version 1.1	General update and addition of S60 3rd Edition, Feature Pack 1 information
July 3, 2006	Version 1.2	General update and addition of detail on S60 3rd Edition, Feature Pack 1
February 7, 2007	Version 1.3	General update and additional information on S60 3rd Edition, Feature Pack 2
April 18, 2007	Version 1.4	Information on RGA APIs added in Chapter 3
June 6, 2007	Version 1.5	Information on Web Run-Time and Web widgets added in Chapters 2 and 3
January 21, 2008	Version 1.6	References to RGA and Map and Navigation APIs removed from Chapter 3 Updated Java™ IDE information provided in Chapter 2 Added information on Forum Nokia Launchpad in Chapter 5

1. Introduction

This document is a reference point for general information on the S60 platform as well as tools for application and content development. Rather than detailed information, it provides a general overview with guidance on where to find additional information through links to documents and Web sites that present more details.

1.1 Purpose and scope

The purpose of this document is to introduce developers to the S60 platform and guide them through the many sources of information on the platform, enabling them to access relevant assistance more quickly and effectively. It also provides an easy reference to the key features of the various platform editions.

1.2 What is the S60 platform?

The S60 platform is a purpose-built platform for smartphones. It supports a large color screen and an intuitive interface, and it incorporates leading-edge communications and device technologies that interoperate safely and respond quickly. Most S60 devices feature:

- A Quarter Video Graphics Array (QVGA) color screen.
- Innovative form design and keypad layout.
- Personal information manager (PIM) applications (such as Contacts and Calendar).
- Advanced telephony features.
- Messaging.
- Internet browsing.

Many S60 devices also feature:

- Flash Lite Player from Adobe.
- Nokia Push to Talk over Cellular (PoC).
- Digital camera.
- Music player.
- Media gallery.
- Video recorder.
- Sound recorder.
- FM radio.
- Over-the-air (OTA) synchronization.
- Viewer and editor for Microsoft Office documents.

2. The S60 platform

The S60 platform guarantees to developers that specific elements will be present in every device based on a particular platform edition and feature pack. It does this using the architecture shown in Figure 1, which consists of the S60 UI style, S60 Applications, S60 Application Services, S60 Java™ Technology Services, S60 Platform Services, Open C, and Symbian OS Extensions built on top of Symbian OS.

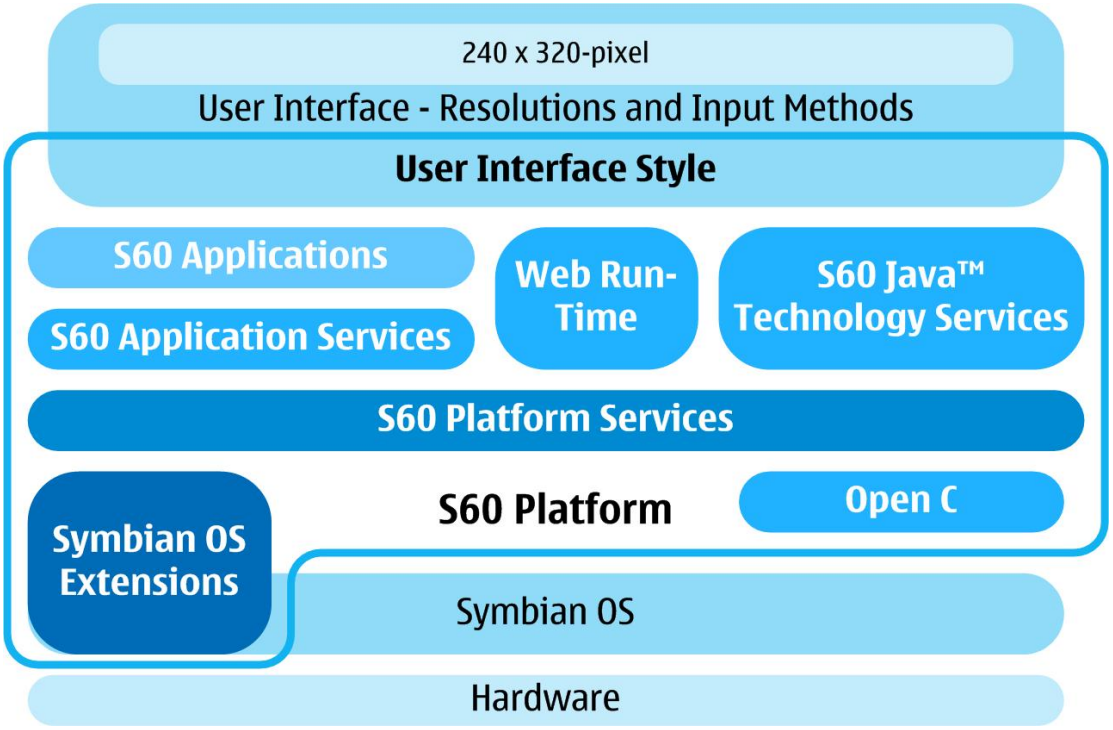

Figure 1: A schematic diagram of the S60 platform architecture is shown.

2.1 Symbian OS

Symbian OS is a purpose-built smartphone operating system. It has an impressive range of technology features — even in its earliest versions. Its memory-management and multitasking features allow for safe and efficient operation under conditions of constrained resources that typify mobile devices. Different S60 editions have used different versions of Symbian OS; details are provided in Chapter 3, “S60 editions.” Note that not necessarily all features available in a specific version of Symbian OS are implemented in a particular version of the S60 platform: It is always better to follow the S60 guidelines regarding what is available, rather than to assume that a particular Symbian OS feature has been implemented.

2.2 Symbian OS Extensions

The *Symbian OS Extensions* are a set of capabilities that allow the S60 platform to interact with device hardware functions such as vibration alert, device lights, and battery charge status.

2.3 Open C

From S60 3rd Edition onward, the S60 platform includes a subset of the Portable Operating System Interface (POSIX) libraries through Open C. Open C is an extension of the POSIX libraries for Symbian OS. It provides a subset of functions from nine well-known standard POSIX and middleware C libraries: libc, libdl, libpthread, libm, libz, libcrypt, libcrypto, libglib, and libssl. Open C enables developers to port middleware and application engines from a desktop environment to the S60 platform.

Open C is a native feature in S60 3rd Edition, Feature Pack 2 and is available as a plug-in for S60 3rd Edition and S60 3rd Edition, Feature Pack 1.

2.4 S60 Platform Services

The *S60 Platform Services* are the fundamental services offered by the S60 platform. These include the:

- *Application Framework Services* — providing the basic capabilities for launching applications and servers, state-persistence management, and UI components.
- *UI Framework Services* — providing the concrete look and feel for UI components and handling UI events.
- *Graphics Services* — providing capabilities for the creation of graphics and their drawing to the screen.
- *Location Services* — allowing the S60 platform to be aware of a device's location.
- *Web-Based Services* — providing services to establish connections and interact with Web-based functionality, including browsing, file download, and messaging.
- *Multimedia Services* — providing the capabilities to play audio and video, as well as support for streaming and speech recognition.
- *Communication Services* — providing support for local and wide area communications, ranging from Bluetooth technology to voice calls.

2.5 S60 Application Services

The *S60 Application Services* are a set of capabilities that provide certain basic functionality for S60 applications. These services are used by the embedded S60 Applications and also are available for use in third-party applications. They include:

- *PIM Application Services* — providing the fundamental features of PIM applications, including contacts, calendar, and task management, as well as associated functions such as notepad and clock capabilities.
- *Messaging Application Services* — providing support for various messaging types, such as short message service (SMS), multimedia messaging service (MMS), e-mail, BIO messages (smart messaging), and instant messaging (IM).

- *Browser Application Services* — providing the capabilities to view Web content, including support for Flash Lite, video rendering, Scalable Vector Graphics (SVG) Tiny rendering, and audio rendering.

2.6 S60 Java™ Technology Services

The *S60 Java™ Technology Services* provide support for the Java™ Platform, Micro Edition (Java ™ ME) Java™ Technology for the Wireless Industry (JTWI) specification (JSR-185). The S60 platform support includes the Connected Limited Device Configuration 1.1 (JSR-139) specification, and the Mobile Information Device Profile (JSR-118) extension to this specification.

Further, the S60 Java Technology Services support a range of additional APIs to enable access to the S60 file system, access to PIM data, use of Bluetooth technology, messaging, audio, video, Web services, security and trust services, location information, Session Initiation Protocol (SIP), and 3D graphics.

From S60 3rd Edition, Feature Pack 2 onward, support is provided for the subset of the Mobile Service Architecture (JSR-248). JSR-248 delivers developers greater consistence in APIs across Nokia platforms because it is also implemented in Series 40 5th Edition. In addition, because JSR-248 should be implemented across a broad range of other manufacturers' Java phones, it will enable developers to more easily create a single application for multiple phones from multiple manufacturers.

2.7 Web Run-Time

Web Run-Time (WRT) is a runtime environment that enables S60 devices to run Web widgets. Introduced in S60 3rd Edition, Feature Pack 2, WRT is powered by technology from the WebKit Open Source Project — the same feature-rich open-source Web technology that is used by the Web Browser for S60.

2.8 S60 Applications

The *S60 Applications* are applications embedded within the platform that are available to a device's user, including PIM, messaging, media applications, and profiles.

2.9 S60 platform technologies

This section describes the key technologies implemented in the S60 platform that are available on most S60 devices.

2.9.1 Communications

Most S60 devices support these communication technologies:

- Telephony.
- Infrared (IR).
- Bluetooth wireless technology.

In addition, many S60 devices also support WLAN.

2.9.2 Messaging

Most S60 devices support these messaging technologies:

- SMS.
- MMS.
- E-mail.
- IM. (The type of support for this varies from device to device.)

2.9.3 Browsing

All S60 devices support browsing. Early S60 editions supported WAP browsing, while more recent editions support full HTTP browsing. The Web Browser for S60, based on open source components from Apple Inc.'s WebCore — the software used in Apple's Safari browser — provides browsing capabilities in S60 3rd Edition and later.

2.10 Development environments

The main S60 development technologies are briefly outlined here.

2.10.1 C++

Symbian OS was built using C++, and this development language provides the fullest access to the feature-rich S60 platform. All versions of the S60 platform support C++ development, and various integrated development environments (IDEs) are available for each version. Each new edition or feature pack has provided additional APIs, and the most important of these are detailed in Chapter 3, "S60 editions."

C++ development for the S60 platform requires two components: a suitable development environment and an SDK for the edition and feature pack(s) at which the application will be targeted. SDKs are provided free of charge.

C++ development for the S60 platform is supported by Carbide.c++, a member of the Carbide family of tools from Nokia. Carbide.c++ is based on the Eclipse IDE and is being made available in four versions: Carbide.c++ Developer, Professional, and OEM Editions, and Carbide.c++ Express.

Carbide.c++ Express, a free version, is designed for general-purpose development of Symbian OS applications. Carbide.c++ can be downloaded from the Forum Nokia Web site's Carbide Development Tools section (http://www.forum.nokia.com/carbide).

Carbide.c++ Developer is designed for application developers with more stringent application-quality requirements. It provides the ability to perform on-device debugging and includes a UI design tool that helps simplify S60 development.

Carbide.c++ Professional is designed for developers who require optimal performance from their applications. The tool includes a performance investigator and crash debugger.

Carbide.c++ OEM is designed for device manufacturers and developers who create fundamental components for device manufacturers.

Carbide.c++ Developer, Professional, and OEM Editions are commercial tools.

In addition, Nokia provides Carbide.vs for C++ developers. This tool integrates Symbian OS application development into Microsoft Visual Studio .NET 2003 and Microsoft Visual Studio 2005. Carbide.vs is available as a free download.

For more information, see the Tools and SDKs section of the Forum Nokia Web site (http://www.forum.nokia.com/tools). To see the full list of tools available, select **Symbian/C++ Tools** from the **Tools and SDKs** drop-down box on the left-hand side of the page.

2.10.2 Open C

Open C is an extension of the POSIX libraries for Symbian OS. Open C provides a set of standard POSIX and middleware C libraries from nine well-known C libraries: libc, libdl, libpthread, libm, libz, libcrypt, libcrypto, libglib, and libssl. The implemented functions have been carefully chosen, after extensive analysis of open source projects, to provide a complete set of commonly used functions.

The implementation of Open C allows developers to reuse software assets and thereby increase productivity. Such assets may include a developer's own library of functions and open source code. In addition, because C libraries are commonly used to create applications on other platforms, such as Linux or Microsoft Windows, the Open C support significantly simplifies the process of porting existing applications to the S60 platform.

Open C also reduces the knowledge of Symbian C++ required to create S60 applications. Developers now can create much of their applications' business logic using familiar C library functions, while relying on Symbian APIs and S60 APIs to create the application UIs and to provide access to native Symbian and S60 functions.

Open C was introduced as a native feature in S60 3rd Edition, Feature Pack 2, with a plug-in extension for devices and SDKs based on S60 3rd Edition and S60 3rd Edition, Feature Pack 1.

For more information, see the Open C section of the Forum Nokia Web site (http://www.forum.nokia.com/openc).

2.10.3 Java technology

Nokia has been at the forefront of extending the available Java APIs from within the mobile information device profile (MIDP) development environment. The APIs available with each new release are detailed in Chapter 3, "S60 editions," of this document.

As with C++ development, Java development for the S60 platform requires a suitable development environment and a suitable SDK. At no charge, Nokia provides SDKs that support the development of MIDlets using NetBeans with NetBeans Mobility Pack and Eclipse with EclipseME.

The most relevant tools are listed in the Tools and SDKs section of the Forum Nokia Web site (http://www.forum.nokia.com/tools); to see the complete list of available Java tools, select **Java Tools** from the **Tools and SDKs** drop-down box on the left-hand side of the page.

2.10.4 Web widgets

Web widgets are lightweight applications created using the standard Web technologies that are used to create Web pages, such as HTML, Cascading

Style Sheets (CSS), JavaScript™, and Asynchronous JavaScript™ and XML (Ajax). On an S60 3rd Edition, Feature Pack 2 device, Web widgets are executed using WRT.

S60 device users can download and install Web widgets as they would any other S60 application or content item. Once installed, Web widgets appear as standard S60 applications and provide S60 device users with a full Web experience, in a way that allows them to personalize the content and services they access.

More information on Web widgets and WRT can be found on the Forum Nokia Web site's WRT page (http://www.forum.nokia.com/webruntime).

2.10.5 Content development

Content development options include developing Web pages that are mobile-browser friendly and providing items such as themes, wallpaper, and ring tones. There is already a thriving market for such items, which can provide developers with a relatively quick return on their product-development investments.

The Carbide.ui S60 Theme Edition for Symbian OS, available free of charge, supports theme development. It allows UI designers and artists to create themes for S60 devices.

A range of other tools are available for content development, and these can be accessed in the Forum Nokia Tools section (http://www.forum.nokia.com/tools). To see the full list, select either **Browsing Tools** or **Media Tools** from the **Tools and SDKs** drop-down box on the left-hand side of the page.

2.10.6 Others

Other development tools that can be used on the S60 platform include Flash Lite and Python.

The S60 platform is the reference platform for Flash Lite, and developers can create Flash Lite 1.0, 1.1, 2.0, and 3 content for various S60 editions and feature packs. Development is supported by Flash CS 3 Professional. For more information from the Forum Nokia Web site (http://www.forum.nokia.com/), select **Flash Lite** from the **Technologies** drop-down box on the left-hand side of the page.

Forum Nokia provides Python for S60, a tool for Python. See the Tools and SDKs section of the Forum Nokia Web site (http://www.forum.nokia.com/tools) for details; there, select **Python for S60 Tools** in the **Contents** section and follow the link to the download page for Python for S60.

2.11 User interface

The S60 platform specification includes a UI style and UI libraries (Avkon), thereby promoting a consistent look and feel; however, the specification does not mandate a particular UI. In attempting to future-proof applications, developers should assume that a range of devices of varying UI size, color depth, and input methods will be available, and they should plan and program with scalability in mind. Developers can also create custom components — normally derived from the Avkon libraries.

3. S60 editions

This chapter provides an overview of the features and capabilities of the various editions of the S60 platform.

3.1 S60 1st Edition

S60 1st Edition is based on Symbian OS v6.1 and provides this extensive range of technologies:

- PIM applications such as Calendar, Phonebook, Photo Album, To-Do list, and File Manager.
- PC connectivity software.
- Pinboard.
- RealPlayer.
- XHTML Mobile Profile (XHTML MP).

3.2 S60 2nd Edition

S60 2nd Edition is based on Symbian OS v7.0s. Its enhancements include:

- Multihoming.
- Java MIDP 2.0.
- Dual IP stacks supporting both IPv4 and IPv6 formats.
- ECom plug-in framework.
- EDGE telephony interface.
- Lightweight multithreaded multimedia framework.
- Support for wideband CDMA (WCDMA).
- WAP 2.0.

Some of the most popular enhancements included in the lead software are:

- *Multimedia applications* — Camera, Image Viewer, RealPlayer, Media Gallery applications, and a voice recorder.
- *Wallet* — an application for storing protected personal information. Virtual cards, such as credit cards, can be stored and then used for payment transactions over the Internet.
- *Themes* — which provide enhancement of personalization via UIs that include themed wallpaper, icons, and bitmaps. These can be applied to give a consistent yet individual look to a device.

There have been three feature pack releases for S60 2nd Edition, all of which provide additional lead software. The main features are shown in Table 1.

Feature pack	Features	Example devices
Feature Pack 1 (Symbian OS v7.0s)	Megapixel camera with 4x zoom, recording, and playback of video clips	Nokia 7610 and Nokia 6670 imaging phones
Feature Pack 2 (Symbian OS v8.0a)	1.3-megapixel camera with 6x zoom, WCDMA/EDGE, IPv6	Nokia 6630 smartphone
Feature Pack 3 (Symbian OS v8.1a)	Scalable UI support (variable screen sizes)	Nokia N90 device

Table 1: Key additions in S60 2nd Edition feature packs are shown.

3.3 S60 3rd Edition

As the mobile market expands and customers' expectations for better performance from their devices continue to rise, it is clear that reliable large-screen phones with short response times and appropriate levels of data security will become the dominant players. With each new edition, the S60 platform introduces significant enhancements in all areas, and S60 3rd Edition is no exception. The combination of a real-time kernel and support for important features, such as scalable UIs and location-based services (LBS), brings real benefits in terms of performance and flexibility allied with opportunities for significant device differentiation and, hence, market segmentation.

S60 3rd Edition introduces significant changes in the S60 platform: a new kernel, a new binary, and enhanced security.

- *New kernel* — S60 3rd Edition is based on Symbian OS v9.x, which features a new real-time kernel called EPOC Kernel Architecture 2 (EKA2); EPOC was the original name for Symbian OS. The new kernel allows device manufacturers to create devices with a single-chip architecture, reduce their bills of materials, and offer S60 devices to the mid-market.
- *New binary* — Symbian OS v9.x is based on a new binary: the Application Binary Interface (ABI) standard for the ARM® Architecture. This binary offers significant performance improvements for applications running on S60 devices. This change has created a binary break with all previous versions of Symbian OS and the S60 platform. As a result, applications for earlier versions of the S60 platform will require recompiling, at a minimum, before they can run on S60 3rd Edition.
- *Enhanced security* — S60 3rd Edition introduces Symbian OS platform security, which provides data caging (a secure folder for an application's data) and capabilities defining a number of APIs that require an application to be certified before it can access those APIs. These features offer protection against malicious software. There is also a range of Open Mobile Alliance (OMA) digital rights management (DRM) version 2.0 features provided.

There have been two feature pack releases that provide additional features to S60 3rd Edition. The main features are shown in Table 2.

Feature pack	Features	Example devices
Feature Pack 1 (Symbian OS v9.2)	Web Browser for S60 fully integrated, Flash Lite 2.0 (optional), and enhanced UI and applications	Nokia N95 multimedia computer
Feature Pack 2 (Symbian OS v9.x)	Multiple data stores for Contacts, middle softkey, unified message editor, Flash Lite 3 (optional), APIs for seamless connection transition, native support for Open C, and WRT, enabling Web widgets	No devices announced yet

Table 2: Key additions to S60 3rd Edition feature packs are shown.

For C++ developers, S60 3rd Edition also brings support for a set of standard POSIX and middleware C libraries through Open C. This replaces the limited support for POSIX standard libraries provided by Symbian OS (through `estdlib`).

Open C support is integrated into S60 3rd Edition, Feature Pack 2 and is available for S60 3rd Edition and S60 3rd Edition, Feature Pack 1 as an add-on.

This feature will enable developers to port components written in standard C to S60 3rd Edition, as well as give developers who are familiar with standard C functions a more straightforward route to development for the S60 platform.

4. Business case

This chapter examines the performance of Symbian OS phones and S60 devices in the marketplace and the business case for utilizing the S60 platform from the perspective of various potential stakeholders.

4.1 Market results

Symbian OS will be the leading platform for smartphones for the foreseeable future. In September 2005, research company Ovum estimated that Symbian OS phones will account for 70 percent of all smartphone shipments by 2009. (See Figure 2.)

The success of Symbian OS comes from offering rich devices from the midrange to the top end, capturing new markets in the process. S60 devices will account for the bulk of Symbian OS device shipments. S60 licensees had shipped more than 100 million S60 devices (as of April 2007). More than 25 S60 3rd Edition models have been launched, and S60 devices are sold by the majority of retail operators worldwide. The S60 platform is licensed to four device manufacturers. All these factors mean that the S60 platform offers a significant and growing market of potential customers.

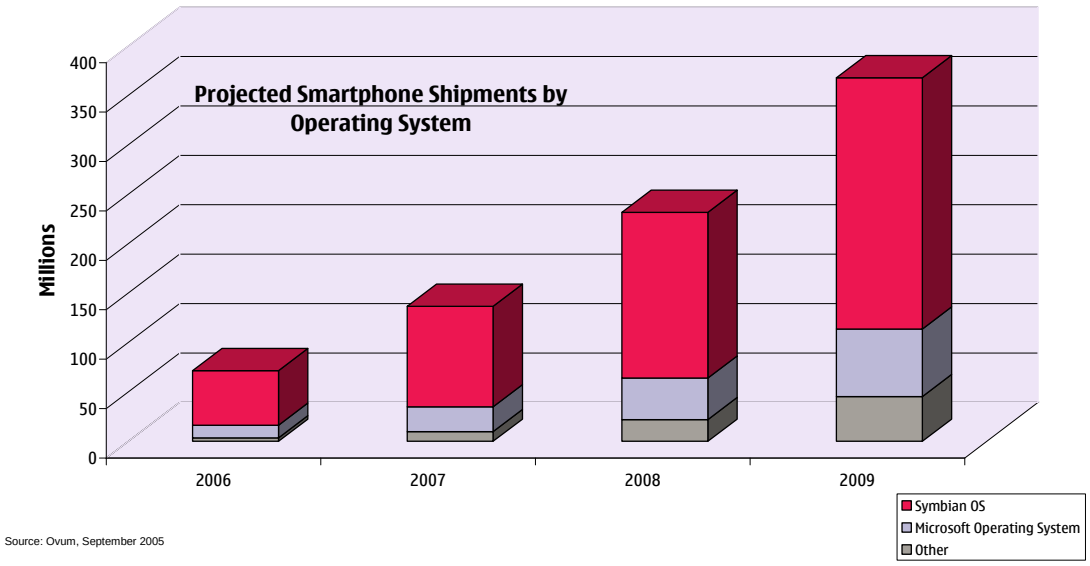

Figure 2: Estimates from Ovum show Symbian OS as the leading operating system for smartphones.

4.2 Stakeholder benefits

The S60 platform is the established leader in the smartphone market, making it an important source of revenue for third-party application and content developers. S60 3rd Edition significantly extends the business opportunities and introduces major enhancements designed to provide long-term stability for stakeholders. There are greater opportunities for market segmentation, with a range of features and applications targeted at the enterprise, game, music, video, personal productivity, and other sectors.

The S60 platform gives the developer community access to industry-standard technologies and a market that can be measured in tens of millions of consumers. The opportunities extend beyond S60 devices, because the platform provides standard

technologies that allow developers to build applications and content for Series 40 devices, Series 80 devices, and the Nokia 7710 widescreen smartphone, as well as for devices provided by other manufacturers.

The S60 platform is well supported by development tools and documentation provided on the Forum Nokia Web site (http://www.forum.nokia.com/) and by a number of tool companies. Established sales channels help developers realize their investments as quickly and easily as possible.

4.3 S60 market resources

This section provides information on where to get help with producing and marketing applications.

4.3.1 Nokia Content Discoverer

The Nokia Content Discoverer (NCD) client is an on-device content portal that makes it easy for mobile consumers to discover, download, and purchase great content and applications. With its ability to integrate with multiple content-delivery systems, the client helps operators maximize mobile application and content sales.

For details, see the NCD section of the Nokia Web site (http://www.nokia.com/ncd).

4.3.2 Product Creation Community

The S60 platform has development resources available that are collectively known as the Product Creation Community. The Product Creation Community can provide assistance with application development, device manufacture, training, and consultancy. See the S60 Web site for details (http://www.s60.com/product_creation_community).

4.4 Future prospects

The S60 platform has performed well in an emerging market and is set to continue on that path for the foreseeable future. The latest versions of the S60 platform allow for greater diversity of form factors with underlying hardware flexibility. The latest kernel and binary promise greater code optimization and efficiency in addition to the robust multitasking capability of the system. There will be a diversity of hardware solutions, because there is now the option to use either a single-chip or dual-chip architecture.

It is expected that S60 will move beyond the classic smartphone market and into greater differentiation, given the hardware options and range of potential form factors. The APIs are continually being enhanced, providing rich functionality suitable for diverse market segments such as enterprise and games.

5. Further information

This chapter serves to help readers find further information on Nokia Web sites and provides some guidance on how to get around on the Forum Nokia Web site, especially where the relevant tools and documents are located.

5.1 Nokia Web sites

Four Nokia Web sites provide more information on the S60 platform and on smartphone issues in general.

- The Forum Nokia Web site (http://www.forum.nokia.com) is the key site for developers and is a source of excellent documentation, tools and SDKs, device specifications, and other free resources, including the Developer Discussion Boards, where community experts can offer help for engineering problems.

  For developers interested in S60 development, the main point of entry on the Forum Nokia Web site is the S60 platform section (http://www.forum.nokia.com/s60). This section provides information on the S60 platform and links to the key resources: tools, documentation, and support.

- A site dedicated to the S60 platform (http://www.s60.com) contains detailed information about available devices, the Product Creation Community, and more.

- Nokia's main site (http://www.nokia.com) is dedicated to general Nokia coverage and includes links to the Nokia Software Market (http://softwaremarket.nokia.com). It is geared more to consumers than to developers.

5.2 Developer support programs

In addition to the open public resources provided on the Forum Nokia site, Forum Nokia offers developers additional services through two programs:

- Forum Nokia Launchpad (http://www.forum.nokia.com/main/forum_nokia_pro/) is a subscription-based program open to developers who wish to work more closely with Nokia. The program includes provisions for access to booth space at Nokia events, pod space at Nokia exhibition areas at industry events, visibility within Nokia via company profiles, and inclusion in an application catalog.

- Forum Nokia PRO (https://pro.forum.nokia.com/) is a members-only site that provides roadmap information for the various platforms, early access to developer documentation, and a host of other benefits.

6. Evaluate this resource

Please spare a moment to help us improve documentation quality and recognize the resources you find most valuable by rating this resource.