8309804 Mobile Internet Technical Architecture

the Symbian™ Operating System

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Introduction

- Symbian OS is the open, standard operating system licensed by the world’s leading mobile phone manufacturers.
- It is designed for the specific requirements of data-enabled 2G, 2.5G and 3G mobile phones.
- Symbian OS is the proven advanced data-enabled operating system for mobile phones and is structured to ease the integration of hardware and software.
- Symbian OS includes a robust multitasking kernel, integrated telephony support, communications protocols, data management, advanced graphics support, a low-level graphical user interface framework and variety of application engines.
Motivation

- In the past, most manufacturers of mobile devices and personal digital assistants implemented their own, proprietary operating system on their devices.

- As the next generation of mobile devices is required to provide more and more features and capabilities, it is becoming increasingly difficult to extend these property operating systems to support additional features.

- An increasing effort has been made by different mobile device manufacturers to develop a standard operating system that would be suitable for a wide variety of mobile devices. The currently most successful non-proprietary operating systems are:
  - The Palm™ OS from 3COM
  - The different versions of the Windows CE/Pocket PC/Pocket PC 2002 Operating System Microsoft
  - The Symbian™ Operating System (Symbia OS™) from the Symbian Consortium
Phone Manufacturers licensing the Symbian OS

**Figure 1.** Phone manufacturers licensing the Symbian OS
In the recent years, the integration of computing and communication devices has increased enormously. Phones and computers became not only a mobile, but are also more and more integrated into one mobile device. Such mobile can be divided in two categories:

- **primarily communication-oriented devices**, so-called feature phones or smartphones with limited means to input, process, store or transfer data or

- **Computing-oriented devices**, so-called communicators with enhanced data input capabilities, like a keyboard, more processing power and memory.

These two categories are also merging more and more, resulting in one mobile device with increasing capabilities for communication as well as computation. For such devices, the Symbian consortium developed the Symbian Operating System and the Symbian platform.
Symbian OS

Symbian is characterised by:

• **Integrated multimode mobile telephony** - Symbian OS integrates the power of computing with mobile telephony, bringing advanced data services to the mass market.

• **Open application environment** - Symbian OS enables mobile phones to be a platform for deployment of applications and services (programs and content) developed in a wide range of languages and content formats.

• **Open standards and interoperability** - With a flexible and modular implementation, Symbian OS provides a core set of application programming interfaces (APIs) and technologies that is shared by all Symbian OS phones. Key industry standards are supported.
Symbian OS

• **Multi-tasking** - Fully object-oriented and component-based, Symbian OS includes a multi-tasking kernel, middleware for communications, data management and graphics, the lower levels of the graphical user interface framework, and application engines.

• **Flexible user interface design** - By enabling flexible graphical user interface design on Symbian OS, Symbian is fostering innovation and is able to offer choice for manufacturers, carriers, enterprises and end-users. Using the same core operating system in different designs also eases application porting for third party developers.

• **Robustness** - Symbian OS maintains instant access to user data. It ensures the integrity of data, even in the presence of unreliable communication, and shortage of resources such as memory, storage and power.
Key features of Symbian v7.0

Figure 2. Symbian OS v7.0 architecture
Key features of Symbian v7.0

• **Rich suite of application engines** - including contacts, schedule, messaging, browsing, office, utility and system control; OBEX to exchange objects such as appointments and business cards; integrated APIs for data management, text, clipboard and graphics.

• **Browsing** - fit for purpose browsing engine for full web browser support and WAP stack for mobile browsing

• **Messaging** - multimedia messaging using MMS, picture messaging with EMS and text messaging using SMS; Internet email using POP3, IMAP4, SMTP, MHTML; standard attachments; fax

• **Multimedia** - shared access to screen, keyboard, fonts and bitmaps; audio recording and playback, and image related functionality (support for all common audio and image formats), including API for graphics acceleration, streaming and direct screen access
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- **Graphics** – direct access to screen and keyboard for high performance; graphics accelerator API.

- **Communication protocols** - wide-area networking stacks including TCP, IP version 4, IP version 6 and WAP, and personal area networking stacks including infrared (IrDA), Bluetooth, USB.

- **Mobile telephony** - abstract API for cellular standards. GSM circuit-switched voice and data (CSD and EDGE ECSD) and packet-based data (GPRS and EDGE EGPRS); CDMA: circuit-switched voice and data and packet-based data (IS-95 and cdma2000 1x); SIM Application Toolkit and SMS. Other standards can be implemented by licensees due to the extensibility of the APIs.

- **International locale support** - native Unicode characters, flexible text input framework, and additional font and text formatting (supporting the Unicode Consortium standard).
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• **Data synchronization** - over-the-air (OTA) synchronization support using SyncML DataSync. PC-based synchronization enabled by PC connectivity toolkit, supported over serial, infrared, Bluetooth and USB links. Framework provides synchronization of PIM data, transfer of files, and document conversion to and from non-Symbian OS formats

• **Security** - full-strength encryption and certificate management, secure communications protocols (including HTTPS, WTLS and SSL), WIM framework and certificate-based application installation

• **Software development** - four main programming and content development options: C++, Java (J2ME MIDP 1.0 and PersonalJava 3.0 with JavaPhone 1.0 options), WAP, and web; tools for building C++ and Java applications and ROMs, and for in-target debugging.

• **Support for multiple user interfaces** - any input mechanism from full QWERTY keyboard, pen-based touch screen, to numeric mobile phone keypad.
The ability for independent software vendors (ISVs) to develop applications for mobile phones is already bringing new uses to these small, connected, mobile platforms. Keeping the platform open enables ISVs to focus on the expanding market of mobile phone applications.

ISVs can develop Symbian OS software in C++ using a Windows emulator that runs on a PC and maps Symbian OS calls to Win32 APIs. The mobile phone manufacturers ship this emulator as part of a Symbian OS software development kit (SDK).

Third-party software is installed on Symbian OS phones with an installation file (SIS file).

This enables the delivery of tamperproof files where the software vendor can be identified.
Symbian OS phones

http://www.symbian.com/phones/nokia_6600.html
Symbian OS phones

http://www.symbian.com/phones/nokia_7700.html
Summary

• Symbian OS is a robust multi-tasking operating system, designed specifically for real-world wireless environments and the constraints of mobile phones (including limited amount of memory).

• Symbian OS is natively IP-based, with fully integrated communications and messaging. It supports all the leading industry standards that will be essential for this generation of data-enabled mobile phones.

• Symbian OS enables a large community of developers. The open platform allows the installation of third party software to further enhance the platform.
Other OS for phones

Motorola announced it will sell its share of the Symbian partnership and turn its emphasis to Java for future smart phones.

Motorola is planning to sell 5.8% of the company to Psion and 13.2% to Nokia which will take care of the 19% that Motorola owns.

Motorola, announced plans earlier this year to produce high-end mobile handsets based on embedded Linux and Java software.

Rumors have emerged that Motorola may be planning to add a Microsoft SmartPhone powered device to its mobile handset portfolio.

"Motorola will launch a mobile phone based on Microsoft software later this year, the first top five handset maker to do so,"
Other features 😊

- **F-Secure Anti-Virus for Symbian OS** is an anti-virus application, which, together with a virus signature update service, provides fully automatic protection for Symbian-based mobile devices against viruses and other malicious or harmful content in all file types.

- **Bugs:**

  ![Application Error]

  Application Error

  You must restart the telephone
References


2. Symbian OS Version 7.0 Functional description, David Mery, Technology Editor, Symbian Ltd
   http://www.symbian.com/technology/symbos-v7x-det.html

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Thanks

Questions?