



The Symbian Platform

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Executive summary

We are witnessing the transformation of the mobile phone from a voice-centric communication device to a tool for managing business and private life, and for triggering and sharing experiences.

In the Mobile Information Society, consumer behaviour is driving the development of applications and services. The key to commercial success lies in understanding consumers, their lifestyles and attitudes, and in creating the product-service combinations that match their wants and needs. Those who deliver winning product categories and platforms with the right technologies will be the victors.

In the quest to further develop and facilitate the next generation of products and services, Nokia will develop a technical architecture that enables high quality, seamless interoperability between key applications, network environments and user identity/addressing. However, we will limit the complexity of the technical environment supporting these applications and services; users simply do not want to be concerned with the underlying technologies. In addition, Nokia supports open technologies, standards and relevant initiatives that support and facilitate the deployment of global technologies and applications and stimulate market growth.

Bringing together all the key elements and managing the challenges they pose is at the core of this task. We will succeed by identifying the relevant communication modes, by defining the key technologies required to support them and by participating in the industry's drive to develop a common wireless platform.

Symbian – the company

Symbian Ltd was created, and is owned by, Nokia, Motorola, Panasonic, Ericsson and Psion. The mission of the company is to set the standard for mobile wireless operating systems, and to enable a mass market for wireless information devices. In practice, this results in two activities:

- the development of core operating system designs – which customer companies can license and build their own systems on
- evangelising the Symbian standard for wireless devices.

Customer companies include all of the 5 shareholders, but any company is free to license the product – the Symbian platform is open. Nokia is committed to open platforms – in the area of Operating Systems as in many other areas.

Excluding the initial shareholders, notable Symbian licensees to date include Sanyo and Sony and Philips – and more are expected.

The Symbian business model is simple – manufacturers pay a fee to Symbian for each device that they sell that uses the Symbian platform.

The first wireless devices to use the Symbian platform will be public by the end of 2000.

The Symbian platform

Description of the Symbian platform

The Symbian platform uses EPOC – a software architecture originally developed by Psion.

EPOC is one of the most exciting (if not the most exciting) C++ programming systems available today. The operating system, with a solid object-oriented design, is combined with particularities that are a necessity for hand-held devices. This includes power management built within the kernel, sophisticated memory management, event handling mechanisms, and effective multitasking.

For efficient use of these facilities, a coherent set of APIs is provided in terms of native C++. In addition, the system is built to be adaptable for different CPUs and hardware configurations. This enables the integration of EPOC-based systems to multiple products, like wireless information devices, handportable computers, and PCs.

The above capabilities reflect the fact that the EPOC system has been designed from the start to be able to use interactive rather than procedural software. This is a significant improvement over many conventional systems where the focus is on threads and processes. On the contrary, EPOC enables the developer to think in terms of interactions and behaviours as the main artefacts. Enabling this shift from procedural to interactive

designs has been one of the main challenges of modern software engineering – and this is one reason why EPOC has earned its reputation for advanced design.

As a result, EPOC programming is somewhat different from conventional systems.

This design has naturally resulted in a client-server architecture – where many applications are clients that use the resources of servers. The client-server framework is widely acknowledged in the software community as a powerful mechanism. In the EPOC system, clients are programs that have user interfaces, and servers are programs that can only be accessed via a well-defined interface from other programs. The role of a client is to serve the user, while servers ensure timely response to all the clients while controlling the access to the resources of the actual system. Additionally, in practice, one server will often have many extra servers relying on the one original server.

To sum up therefore, EPOC is a very effective way of improving the quality and performance of software destined for hand-held devices.

The Symbian platform as an enabler of the Mobile Information Society

The Mobile Information Society is coming ever closer with the adoption of the Symbian platform by Nokia – and all of the other major players in the wireless industry.

In order to build a society people need to be able to communicate. By establishing the Symbian platform as the de facto standard, people everywhere will be able to work with each other simultaneously, play with each other, send messages to each other as easily as they can currently talk to each other.

The Mobile Information Society needs secure and reliable connections, it needs to be ready for change and it needs to be open to anyone – not just manufacturers. One key feature of EPOC is that robust applications for the products can be written by almost anyone.

Software Development Kits (SDKs) – usable for all Symbian products – are available from Symbian, whilst Nokia will make available SDKs specifically designed to work with Nokia Symbian devices.

The SDKs are an extensive set of tools (with full documentation) to enable anyone to use the APIs and the full capabilities of the system, and to fully exploit the power of the Symbian platform.

The field is open for anybody to create the killer applications for the Mobile Information Society.

Writing programmes for – and porting software to – the Symbian platform

For any system, it is tempting to reuse existing software – this often means porting pre-existing software into a new environment. Whilst simple in principle, it is frequently not so simple in practice – especially in areas where features in different systems need to work together. In practice, with the Symbian platform, many existing C++ and C programs can be easily transformed into EPOC executables.

The Symbian platform is supported by code libraries that hide the underlying communication protocols from application designers. Consequently, writing reliable software that will work over a range of different communication technologies requires little more effort than writing an application for one communication technology.

Java™ support is included, partly in order to overcome the minor problems experienced when porting C and C++ software to the Symbian platform. In principle, this means that Java code can be installed on top of EPOC. Some practical problems may be encountered due to problems related to the amount of memory that can be offered in hand-held devices. This is not a flaw in the design of the Symbian platform, however, but just a reflection of the differences between EPOC and most conventional computing systems. In connection with Java interpreter, sophisticated APIs and applets are also provided for the user's convenience.

Taken together, these enable rapid adoption of already existing Java programs as well as easing the introduction of EPOC Java facilities for new developers.

With the Symbian platform, you will no longer need to be an expert in the manufacturer's embedded software to be able to write a program for a wireless device.

Symbian platform evolution

The Symbian platform is committed to supporting new technologies – such as GPRS, Bluetooth, WAP, SyncML, and will be the platform on which new applications can be developed. As new technologies come on stream, applications will become increasingly sophisticated – especially when technologies are used in combination. However, the platforms will be relatively constant – allowing developers to concentrate on applications for their customers.

Application writing, on the other hand, is something that will not take place in the scope of EPOC architecture evolution.

This leaves developers free to create their own applications and rely on the underlying EPOC architecture to cope with technology upgrades. In fact, applications can be written such that even when the underlying communication mechanism is changed, only minor changes (or possibly no changes at all) are needed.

Benefits of the Symbian platform to the industry and to consumers

The Symbian platform is designed to be extendible – and is shared between all Symbian devices. What this means is that software need only be developed once for it to work on any Symbian device with the same UI. For different UIs, some extra work is needed to optimise the application.

As mentioned earlier, software could be written by virtually anybody. This software could be stand-alone or used only by the user of the device. However, just as easily, the software could be a networking application, enabling users to communicate with other users, or to access a resource somewhere on the Internet.

The effect of this open platform will be the enabling of a Symbian economy. No longer will mobile devices only interact with a limited range of other devices (usually mobile devices from the same manufacturer, or PCs – via bespoke connectivity software). Users will be able to interact with any device using the Symbian platform.

Consequently, developers benefit from having access to a much larger market – porting work is minimised between hardware. Consequently, it is to be expected that we see a lot of high-quality software systems, produced by different vendors, downloadable to wireless devices at low cost. This reduction in costs

can only mean that competition intensifies – which is obviously in the interest of consumers.

Among the many benefits to the consumer, perhaps the key ones are that there will be more software to choose from, as the reduced porting costs mean lower entry barriers for software developers and that consumers will also be able to seamlessly interact with many more users than ever before.

Symbian EPOC architecture business models

The establishment of the Symbian EPOC architecture as the de facto standard will provide a mass market for:

- Licensees
- Independent Software Vendors
- Network operators
- Content providers and content aggregators.

All of the above parties will take advantage of the flexibility of the Symbian EPOC platform.

The following list covers some (but definitely not all) ideas that could be translated into business models:

- Rich calls
- Messaging
- Browsing
- Personalisation
- Pay-per-download or per use of

software, or not paid by user at all but by advertisers

- Area-dependent software downloads (e.g. works as a search facility in a certain area)
- Extension of corporate networks into the mobile arena
- Extension of consumer networks into the mobile arena – for instance in the areas of games, Internet and e-mailing.

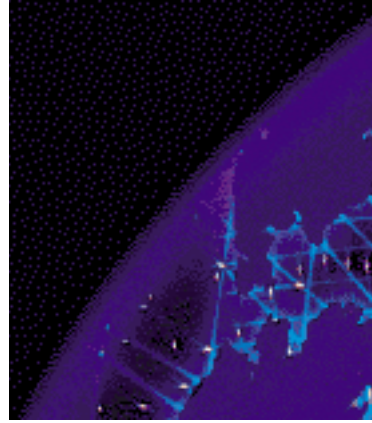
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