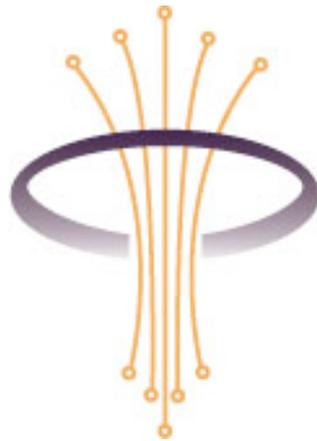




Leveraging OSGi™ Technology

A Business Whitepaper

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OSGi[™]
Alliance

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Introduction

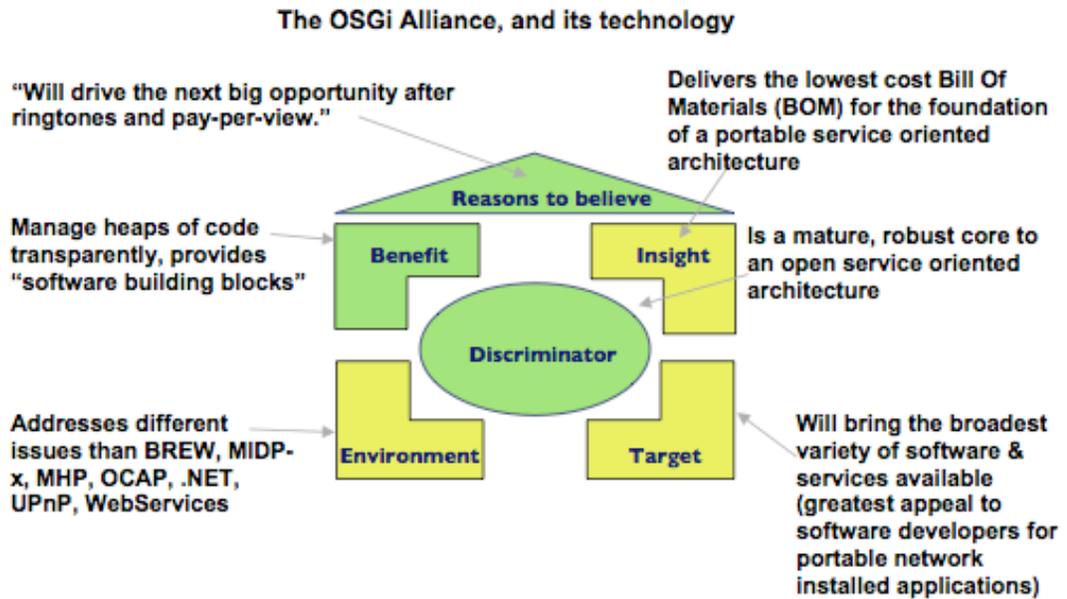
The OSGi™ Alliance is a worldwide consortium of technology innovators and business leaders who advance a proven and mature process to assure interoperability of applications and services with a component integration platform. OSGi specifications provide the platform for universal middleware, establishing a standard service-oriented, component-based environment from which businesses can speed development and better serve customers. The OSGi Service Platform greatly increases the value of a wide range of computers and devices that use the Java™ platform.

In a world increasingly reliant on efficient and easy-to-use personal and business productivity software and services, OSGi technology leverages industries and their networks to easily and securely deliver new capabilities to devices.

For years, businesses have battled to develop the next “killer application” and deliver it first. Software delivery is now integral to a device’s value proposition – whether it’s a personal digital assistant (PDA), personal computer or enterprise system. The next “killer ap” may not be an application at all, but a reliable and standard delivery system. OSGi technology enables that delivery system and creates a market for applications to be delivered anywhere and anytime, easily and securely without interruption to the user.

The OSGi Alliance and its technology address the following challenges:

- How do we assemble, maintain, repair and enhance software affordably, transparently, efficiently and reliably?
- How do we create the flexibility needed to accommodate the wide range of business models used in the market today for software and services, and enable new and profitable business models for the future?



Leverage Networked Devices for New Business Opportunities

Digital networks are a pervasive presence in modern life, extending into virtually any corner of the industrialized world on a variety of devices that, on the surface, do not appear to be computer systems - but they are. Automotive electronics and telematics systems, "smart" phones, home and mobile entertainment devices have all the essentials for a computing system – a central processing unit (CPU), memory, digital data input/output capabilities, and persistent storage (either local or remote or both) – and they all need software. Computer systems, and the software that drives them, have become a fundamental core to almost every electrical device we use today. They transform historically fixed function devices into intelligent, adaptable devices able to conform to new users' demands.

Consider the potential users:

- The user (installed) base of digital mobile phones is now 1 billion, with more than 300 models. These phones can download and run Java applications.
- The global number of homes connected to a broadband network was 144 million in 2004 and was growing at about 55 percent each year.

This creates tremendous new business challenges and opportunities, because of trends that move forward with unrelenting force:

- Software is increasingly vital to the value of the devices we buy and use daily.
- All kinds of electronic devices are now capable of connecting to some form of network.
- These ubiquitous networks are able to affordably connect these devices to the data and services we want.

There are several market drivers for consumers behind these trends. Consumers want choices in digital services and devices. They want to enjoy these services on different devices in different settings, and they want the experience to be seamless across the different settings and devices.

Some of the business market drivers behind these trends are different but just as compelling as consumer market drivers. Businesses want to take advantage of the growing number of connected devices in the world to conduct their business. They want to improve their return on investment (ROI) by leveraging the large installed base of networked devices. They want to offer their services on the broadest possible array of electronic devices. And most of all, businesses want to stay in touch with their customers, whether they are at home, on the move, or at work.

The new challenges are numerous:

- How does a manufacturer maintain and repair the increasingly complex software that resides in consumer electronics, major appliances, automotive electronics, or digital mobile phone?
- How can service providers and operators securely provide and support profitable new services that require exponentially more computing resources to deploy than in the past?
- How can a manufacturer, service provider, or operator manage these software-centric devices in the network without burdening the customers with onerous and difficult device software maintenance?
- How do manufacturers, service providers, and operators cope with the explosion of software complexity within devices and the services surrounding them?
- What technology can these stakeholders adopt that will effectively span all the hardware/operating system platforms embedded within all the devices you want to use?
- What technology can the participants in the value chain adopt to support them with the challenging operational, logistical and legal relationships that this environment will entail?

The new opportunities are vast:

- Improve customer satisfaction and repeat sales by dynamically repairing software defects and offering additional functions, features and services when requested by the consumer (the after-sale and up-sell market).
- Expand the range of practical services and applications by utilizing any computing resource that is available throughout the network to provide the solution – including those within the devices we commonly use.
- Expand the range of devices on which digital services can run, thereby dramatically increasing the initial installed base.
- Bring the benefits of continually enhanced software services to customers -- and the profits to their suppliers -- by installing and managing it through the network.

- Increase a manufacturer's, service provider's or operator's competitiveness by improving the time-to-market for their goods and services with a componentized, service-oriented environment;
- Increase competitiveness by leveraging the existing installed base of devices to achieve better return on investment (ROI).
- Increase the number of services that can be deployed by reducing the required initial investment.

Business can capitalize on these opportunities by adopting an open, industry-standardized, portable service-oriented computing platform. The OSGi Service Platform, developed and standardized by the OSGi Alliance and provided by its members, addresses emerging challenges and opens new opportunities.

Dynamic Module System Powers Wide Range of Business Models

The dynamic software component architecture is at once open and secure. OSGi Alliance members develop, advance and standardize the OSGi Service Platform in an open environment while providing the flexibility and customization necessary to accommodate a wide range of business and payment models for the applications and services which run on the platform. OSGi technology enables applications and services to interoperate reliably and securely, increasing the value of the device and providing new markets for applications and services installed as pre-built and pre-tested component subsystems.

For example, dynamically installable software components such as a digital rights management (DRM) system and an e-commerce billing mechanism might be deployed as OSGi "bundles" (applications) by an operator as a fundamental part of a complete service offering such as a digital music jukebox.

Applications and services installed into an OSGi Framework on a device:

- can exist within a completely "walled garden" service network and enforce its security,
- or can come from any provider reachable on a network,
- or any variant in between.

Subscriptions, pay-per-use, rental, purchase payment models and more are all possible within an OSGi Service Platform environment. Nothing within the OSGi Service Platform precludes a completely closed and protected environment, a completely open network environment -- or any hybrid network environment. The OSGi Service Platform provides mechanisms to assist and complement the deployer's policy choice. *(These mechanisms are overviewed in the OSGi Technical White Paper and detailed in the OSGi specifications, http://www.osgi.org/osgi_technology/download_specs.asp?section=2)*

Manage the Lifecycle and Future-Proof Offerings

Manufacturers and operators who implement OSGi technology in their products and services do not have to wrangle or navigate the complexities between different systems and suppliers. OSGi technology adopters benefit from improved time-to-market and reduced development costs because OSGi technology provides for the integration of pre-built and pre-tested component subsystems. It reduces maintenance costs and advances unique new aftermarket opportunities because networks can be utilized to dynamically update or deliver services and applications in the field.

The OSGi Service Platform is the fastest and most affordable way to answer consumer and business demands for broad and new services and features that are easy to use and do not require expensive technical support to deploy.

OSGi technology provides functionality to Java that makes Java the premier environment for software integration and thus for development. Java provides the portability that is required to support products on many different platforms and the OSGi technology provides the standardized primitives that allow applications to be constructed from small, reusable and collaborative components. These components can be composed into an application and deployed remotely and dynamically without inconvenience to the user or costly service interruptions to the provider.

The OSGi Service Platform provides the only industry-standard, componentized, service-oriented architecture with these capabilities available today. This is a revolutionary opportunity to increase the value and lifecycle of common products like the infotainment systems in cars and homes, commercial fleet management systems, and digital mobile phones that are all now able to securely access the Internet and other networks.

For many users it is invaluable to be able to continuously run vital applications and services locally while they are intermittently connected or disconnected from a network. The OSGi Service Platform makes this possible.

The OSGi Service Platform enables product or service offerings to leverage now ubiquitous networks to maintain and enhance products and services in the field. It is a vital distinction as product and service value is now defined by software capabilities. The software in products, and the services around them, can now be updated dynamically via secure networks to fix problems or add new functionalities and value to the user's devices or to make services available on a range of different-brand devices owned by a single user. These innovative capabilities open completely new business opportunities for lower-cost maintenance and repair, or the purchase of valuable new features. Expensive recalls and high development costs can be reduced to meet increasing consumer demands.

The OSGi Service Platform serves as a foundation for a rich client platform much more capable than any thin client, and yet it is still frugal with resources. It adds virtually no run-time overhead in terms of execution speed.

Using an OSGi technology-enabled rich client platform, along with an OSGi management agent, could also provide OSGi applications and services with the ability to manage how and how much they use the underlying available networks. These applications or services could, for instance, manage network utilization/throughput, or provide a certain level of Quality of Service (QoS). This benefits both the network operator and the user. The operator could deploy services and applications that shape its network traffic to optimize profits and provide the user with an enhanced user-experience from better throughput and QoS.

Where Does It Fit?

The OSGi Service Platform can reside in any device with sufficient computing resources anywhere in the entire network, from the server at an enterprise or operator, to the network processors within the network infrastructure, to devices at the end points (e.g., smart phones). Within a given device, the OSGi Service Platform is a vital software layer between the underlying virtual machine and the applications above, providing the ability to maintain, repair and enhance the device's applications affordably, transparently, efficiently and reliably. These essential capabilities extend the end-to-end programming model from robust, enterprise-ready applications into a whole new class of computer systems: the pervasive devices around us like cars and mobile phones.

Interesting possibilities arise when software components can be moved to devices only if and when they are needed. Here is an example:

Near the end of the business day a real estate agent gets a call on her mobile smart phone from a new client requesting her property be listed for sale, so the agent enters the property address into her phone and agrees to meet the property owner at that address in 15 minutes. The real estate agent gets into her car and wirelessly docks her phone with her car's telematics system and transfers the new property address into the navigation application, which guides her to the address to meet with her new client. After the agent has gathered the details of the property and entered them into her phone, she goes home. While driving home, her phone, which is docked to the car telematics system again, transmits the data into the central multiple listing service database for prospective buyers to search. The car telematics system gives an audible confirmation that the data has been properly stored into the database. Upon arriving home, the real estate agent grabs her phone and goes inside where her home network system detects her phone's presence. Resting a moment to watch some news, an alert is posted on her television in a graphics overlay that indicates that her new property listing has already received a buyer's offer. The agent moves to her home office PC to see the details of the offer and potentially complete the transaction.

The modular software components in this real estate sales force automation example were dynamically installed across various different networks into a variety of different devices which each had varying user interfaces and computing resources. The OSGi Alliance and its members see a mounting demand for such seamless software updates, as illustrated here, and strive to enable such scenarios with open OSGi technology.

Why an Open Industry Standard Instead of Using Proprietary Technology ?

Sophisticated end-to-end system solutions are often complex and can seldom be built from a uniform single supplier's technology, particularly when integrated with existing critical systems. Open standards greatly increase the ease and capability to interoperate, facilitating the integration of innovative new products with valuable existing systems. This not only reduces purchase costs, it fosters cooperation between the actors of the value chain needed for the full solution.

Competition between suppliers increases the implementation quality available to the market for open industry standards like those of the OSGi Alliance. Rigorous industry peer reviews of these specifications increases the quality of the standard itself.

Even if one company abandons an open industry standard, the solution will be maintained and further developed by other industry stakeholders. Single vendor approaches tend to be abandoned more quickly, requiring its users to incur expensive migration costs. Thus, an open industry standard is a better long-term investment and it increases the return on that investment.

Overcoming single-vendor dependence, open industry standards also increase the user's flexibility to choose between various suppliers of implementations and products based on the same standard. Even if the purchaser chooses another supplier after an initial deployment, the switch between products based on the same open standard is usually much more cost-effective than a change between different proprietary technologies. While two suppliers' products based on the same open industry standard have the same interfaces, a change of a proprietary system requires a higher investment due to the extensive rework necessary to adapt to its interfaces.

Conclusion

The technology developed by the OSGi Alliance and its members provides the robust, mature foundation for a service-oriented architecture the industry can build on. Its open industry standard approach fosters healthy competition to provide its adopters with interoperable, world-class products. The dynamic module system creates new capabilities to assemble, maintain, repair and enhance software affordably, transparently, efficiently and reliably through the network. These combined capabilities generate brand-new business opportunities for competitive and profitable services.

Formed in 1999, the OSGi Alliance focused initially on solutions for the Embedded Java and networked device markets. As a result, OSGi technology has been implemented and deployed in products and solutions throughout the world and across a range of markets. Today, OSGi technology also enjoys widespread acceptance in the Open Source community, as demonstrated by the Apache Felix and Derby projects, the Eclipse Callisto, Equinox and Corona projects, OSCAR, Knopflerfish, and others. As a result, the core OSGi technology is now increasingly prevalent in the Enterprise, and it is also seen as the key component of a next-generation Java Service Platform that enables the dynamic deployment of Web 2.0 services and Mashups.

Many organizations, both members and non-members, are driving success by adopting and deploying OSGi technology. Organizations like the ERTICO Global Standard for Telematics (GST) project, BEA, BMW Group, BSH Appliances (Bosch und Siemens Hausgeräte GmbH), and DaimlerChrysler FleetBoard have all utilized OSGi technology to improve their projects and products for their audience and customers (*more references and details available on the OSGi Alliance public website - www.osgi.org*). High industry interest has propelled the formation of OSGi Users' Forums and Groups worldwide, including Japan, Korea France and Spain. OSGi Users' Forums and Groups give technologists a place to learn more about the tremendous advantages of utilizing OSGi technology, and share experiences of how to best incorporate it in their products and services. The OSGi Alliance serves as a focal point of coordination for our Users' Forums and Groups and can help direct you to their web sites and activities.

For further information please visit our web site <http://www.osgi.org> or contact:

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About the OSGi Alliance

The OSGi Alliance is a worldwide consortium of technology innovators that advances a proven and mature process to assure interoperability of applications and services based on its component integration platform. The alliance provides specifications, reference implementations, test suites and certification to foster a valuable cross-industry ecosystem. OSGi technology is delivered in many Fortune Global 100 company products and services. Member companies collaborate within an egalitarian, equitable and transparent environment and promote adoption of OSGi technology through business benefits, user experiences and forums. For more information, visit <http://www.osgi.org>

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