Parlay/OSA - a New Way to Create Wireless Services

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Abstract

This paper gives an overview of the Parlay/OSA APIs, an open interface created by a consortium of 65 companies in the IT and telecom industries, which enables the creation of new telecommunications services. The Parlay/OSA APIs can be used to develop mobile data services, as well as fixed network services, and services for a converged next generation network. Parlay/OSA includes specific capabilities designed to enhance mobile data services, including location, terminal capability, connection management and charging.

Network Operators and Service Providers are looking for new sources of revenue, and new value added services are a key part of this initiative. Parlay/OSA enables the development of these new services using the same technologies used for rapid application development in the IT community: open APIs, distributed computing, Java and Web Services. The paper will describe the Parlay/OSA architecture, will give examples of services enabled by Parlay/OSA, and will describe the adoption of Parlay/OSA around the world.

Keywords:
[3GPP, 3GPP2, mobile service creation, open network API, OSA, Open Services Architecture, Parlay, Parlay APIs, Parlay Group, Parlay-X, Parlay Web Services, service creation, web services]

What is Parlay/OSA?

Parlay/OSA is an application programming interface (API) that enables the rapid creation of telecommunications services by leveraging IT application developers to create telecom services.

The Parlay/OSA APIs are defined by the Parlay Group (http://www.parlay.org/) which is a not-for-profit consortium of over 65 companies representing both the telecommunications and the IT industries. The Parlay Group was founded in 1999, and since then it has produced four versions of the Parlay Specifications, each one building on the last, and incorporating new requirements and feedback from implementers in the industry. Parlay Group member companies include Alcatel,
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British Telecom, Ericsson, Fujitsu, HP, IBM, Incomit, Lucent, NTT, Siemens, Sun, Telcordia Technologies, Telecom Italia, Teltier, and over 50 other companies from North America, Europe and Asia. OSA or Open Services Architecture, refers to the architecture for mobile services developed by the 3rd Generation Partnership Program or 3GPP (http://www.3gpp.org), and also adopted by 3GPP2. Parlay is the API portion of OSA.

Parlay/OSA also enables enterprise applications such as field force automation (FFA), sales force automation (SFA) and bank branch automation to exploit capabilities in the existing wireless and AIN networks. There are examples of Parlay/OSA services later in this paper.

The Parlay/OSA APIs are technology independent: they were designed to be used for mobile networks, for fixed networks and for next-generation networks based on the IP protocol. Equally, the Parlay/OSA APIs can be used by developers working in a number of programming languages, such as C, C++ and Java.

Parlay/OSA is based on open standards such as CORBA, IDL, Java, UML, and Web Services (SOAP, XML and WSDL).

The Architecture of Parlay/OSA

The intent of the Parlay Group when it was founded was to encourage the convergence of communications and computing. One way to do this is by adopting the technology used to develop IT applications to simplify and speed up the development of communications services. This approach and benefits of using IT technology to assist in the development of communications services is described further in [Lozinski/Creamer 1999].

In telecommunications and networking, layered protocols have played a very important role. A protocol stack places different communications functions at different layers in the stack. The individual protocol layers then define the way in which network elements communicate. Well-known protocol stacks include the TCP/IP stack, which includes the HTTP, TCP and IP protocols and many others. In telecommunications, the Signalling System Number 7 stack is pervasive, and it includes the ISUP, TUP, MTP-3, MTP-2 and MTP-1 protocols. The definition and standardisation of communications protocols means that it is possible to guarantee interoperability between network elements, and as a consequence to build networks from multiple vendors’ equipment.

In software development, the focus has been on the interfaces between individual layers. Examples of common programming interfaces include POSIX (the APIs used in all Unix and Linux systems), and WIN32 (the APIs in Microsoft Windows 95/98/2000 etc). This interface is called an API or application programming interface. One of the benefits of using common APIs is that it ensures that applications are hardware and vendor independent and can be ported to new platforms easily. One measure of the success of this approach is seen when we consider that there are around 3 million professional software developers worldwide. Contrast this to less than 10,000 specialized telecom service developers.
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Before the advent of Parlay/OSA, standards development organizations in telecommunications, such as TIA, ITU-T and ETSI had focused only on the specification of protocols.

Using the API approach in communications means that it is possible to write portable applications that will run on a variety of underlying protocols without change. A specific example may help. A developer can build a Parlay/OSA application that sets up a conference call when a group of people are free, while not restricting that application to an IS-41 network, or a GSM network or a SIP-based network.

The Parlay/OSA Application Programming Interface (APIs)

Parlay/OSA includes a comprehensive set of APIs for communications applications which include: Mobility, Location, Presence and Availability Management, Call Control, User Interaction, Messaging, Content Based Charging, and Policy Management. The capabilities which these APIs offer:

Common Data Definitions
The objects and types used throughout the Parlay specifications

Framework
How applications authenticate themselves to the network. How applications discover what facilities are available from the network. Fault and load management.

Mobility
How applications find the location of a terminal. How applications request notifications when terminals change location

Terminal Capabilities
How applications find out the features of the terminal

Data Session Control
How applications manage data sessions initiated from terminals. This is typically used for GPRS (and other 2.5G) applications

Presence and Availability Management
How applications manage presence “I am at my computer” / “I am away” and availability “I am in a meeting” / “I am available to be contacted”. Typically used in Instant Messaging types of applications and their extension to wireless networks

Account Management
How applications query accounts and charge history

Charging
How applications request payment for services (“content-based charging”). How applications reserve payment for a future service. This allows applications to work in a pre-paid network.

Call Control
How applications set up calls in the network How applications set up multi-party (conference) calls in the network How applications are used to route calls from the network, eg so that an enterprise application can manage call diversions for an employee. How applications can set up multi-media calls

Generic Messaging
How applications interact with messaging systems, such as voice, FAX or email

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Connectivity Manager
How applications manage Quality of Service (QoS) and the configuration of Virtual Private Networks (VPNs)

Policy Management
How applications interact with policy-enabled networks

The Parlay/OSA Framework

One of the key requirements from network operators and service providers since the inception of Parlay/OSA has been to ensure that opening up the network by defining an API did not expose the communications infrastructure to unauthorized use or other threats. This is the function of the Parlay/OSA Framework. The framework is implemented in the Parlay/OSA Gateway, which is described below in more detail.

All applications and services that want to use the Parlay/OSA APIs first have to register with the Parlay/OSA framework. The Parlay/OSA framework is a software component that cryptographically authenticates the application, and returns object references to the application for those Parlay/OSA functions (or service capability features) it is has been allowed to use by the service provider. The Parlay framework solves a number of security and availability problems.

[Figure 1. Parlay Technical Approach ]

See [Moerdijk] for some of the design principles behind the Parlay/OSA Framework. The detailed specifications of the Parlay/OSA framework are in part 3 of [Parlay v2] [Parlay v3] and [Parlay v4].

How Parlay/OSA fits into the Telecommunications Network

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Parlay/OSA works as an enhancement to the current network or networks used by a service provider.

The role of the Parlay/OSA Gateway

The Parlay/OSA model adds a new network element - the Parlay/OSA Gateway - which is used to link applications using the Parlay/OSA APIs with the existing network elements. The Parlay/OSA Gateway is under the control of the network operator or service provider, and is a single point through which all Parlay/OSA interactions pass. This means that applications are isolated from the specific protocols used within the network by the operator, and networks can be evolved without affecting existing applications and services. The Parlay/OSA Gateway is the element that implements the Parlay Framework.

This approach still provides vendors with flexibility in how they implement the Gateway. Many vendors opt for a stand-alone gateway, which interfaces to the individual network elements such as SSPs, Location Information Servers and and Policy management engines using native protocols (SS7/INAP, LIF in the cases above. Examples of this approach are Ericsson's Network Resource Gateway (also branded as Jambala), Lucent's MiLife Parlay Gateway and AePONA's Causeway Parlay Gateway. The flexibility of the Parlay/OSA approach means that other vendors have integrated the Parlay Gateway into an existing IN platform, such as an SCP. Examples of this approach include Marconi's Application Mediation Gateway, which is a component of the System-X SCP, and Telcordia Technology's Open Services Gateway, which is a component of the ISCP platform.
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From an operator's perspective, the fact that the Parlay/OSA Gateway interfaces to other elements of the network using existing SS7 and IP protocols provides additional vendor choice. It is quite straightforward to use a gateway from a different vendor to the supplier of the existing network infrastructure.

Connecting Application Servers in the Enterprise to the network

The architecture of Enterprise applications has converged on a standard pattern which is used throughout the IT industry. Client applications (web based, running on PCs) interact with business applications located on web application servers, which in turn make use of data from mainframe systems. One of the key elements of this approach is the application server which is a highly available software system which supports many web applications at the same time. For an introduction to enterprise application servers see [Brackenbury et al 1998] or any book on Java 2 Enterprise Edition (J2EE).

Parlay/OSA assumes that applications will run on an application server, and will connect to the Parlay/OSA Gateway over a TCP/IP network.

There are two scenarios. In the first, the applications and the application servers are in a corporate data centre, supporting business applications, and using the facilities of the communications service provider's network, through the Parlay/OSA APIs to query the location of a truck or a field engineer. In the second, the applications are hosted on behalf of the enterprise by a third party. This could be an Application Service Provider (ASP) or a strategic outsourcer. The applications still use the Parlay/OSA APIs to interact with the service provider's network.

The role of Application Servers in the network

Service providers also want to take advantage of the benefits of the Parlay/OSA approach for the services they offer to subscribers. A number of service providers have deployed application servers within the network, which run services developed by third-parties and which connect to a standard Parlay/OSA gateway. This has the regulatory benefit that the service provider is using the same interface for its own services as well as those offered by third parties.

The Relationship of Parlay/OSA with other industry initiatives

The role of the Parlay Group has been to act as a pioneer for the new approach of using APIs for communications services and applications, and to work with other related standards bodies and industry groups to avoid duplication and to publish common specifications. The Parlay Group has also developed close links with other fora and industry groups. These liaisons are important to avoid duplication of work and confusion in the industry.

Much of the technical work has taken place in a Joint Work Group, which includes members of Parlay, 3GPP and ETSI, and which brings together all three organizations. 3GPP is the organization developing the specifications for 3rd generation mobile networks, which are evolved from GSM. The resulting specifications are jointly published by Parlay and ETSI. In North America and the Far East, 3GPP2 is the
organization developing specifications for networks evolved from CDMA and ANSI-41 networks. 3GPP2 is also adopting the output of the Joint Working Group, which is independent of the underlying network and radio access network technology.

The Parlay Group has had a long-standing co-operation with the Presence and Availability Management Forum (PAM Forum) which has focused on advanced mobile applications based around concepts of communicating with people based on their current connectivity to the network (presence) and their current activities (availability). The Parlay Group has included support for PAM APIs in version 4 of the Parlay API Specifications, which were published in November 2002. In April 2003, the PAM Forum merged into the Parlay Group.

The PayCircle is an organization focusing on the technology for mobile payment and e-commerce. Members of PayCircle and Parlay collaborated on the creation of a set of Web Services specifications for Payment. These were published as part of the Parlay-X specifications in April 2003.

The Open Mobile Alliance (OMA) is a recently formed group looking to simplify the creation of mobile applications and services. In May 2003 the Parlay Group and the OMA signed a co-operation agreement for the two groups to work together.

The Parlay specifications have also been translated into Chinese and adopted by the Ministry of Information Infrastructure in Beijing in 2002.

**The Benefits of Parlay/OSA**

**Rapid Service Creation**

Parlay/OSA is based on the same approach that commercial software developers use when building applications, as opposed to the proprietary service creation environments that have been widespread. One advantage of this is that it is easy to develop Parlay/OSA applications using off-the-shelf development tools for Java applications such as Borland's J-Builder, or IBM's Websphere Studio. A number of vendors, such as Ericsson and Open API Solutions, also have Parlay/OSA test tools, which means that it is possible to test an application from a laptop running Linux or Windows.

Ericsson, IBM and Telenor have run experiments, and have found that using Parlay/OSA significantly speeds up the time taken to develop communications applications when compared with traditional service creation tools.

**Network Independence**

The Parlay/OSA APIs were designed, wherever possible, to be independent of the underlying network. A mobile data application does not need to know what technology is used in the underlying network to implement location services. The application developer just wants the location co-ordinates and the accuracy of the fix. This allows an application to work equally well on different networks, and the same application can even be ported to a fixed network. Again, the application isn't
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contested how location information is determined, just in the location data itself. Similar considerations apply to other functional areas - such as setting up a call, or charging the subscriber an additional amount for content or a service.

Vendor Independence

A consequence of the technology- and network- independence of the Parlay/OSA APIs is that they are also vendor-independent. Service providers benefit from having a single set of APIs that are supported on multiple manufacturers' platforms. This provides additional flexibility in deployment.

Broad pool of application developers

The use of standard software technology has meant that software developers with experience of C++ and CORBA, or Java and EJB, can easily develop applications using Parlay/OSA. There are estimated to be around 1.5 million C and Java developers in the world. This is in contrast to the situation, for example, with AIN, where new services could only be created by developers with very specialized training, numbering a few thousand worldwide.

Third Party Independent Software Vendors (ISVs)

One result of the use of standard software development technology is that it has created a growing community of independent or "third party" software vendors who develop and sell applications and services based on Parlay/OSA. Parlay Group meetings regularly feature a showcase, where vendors can demonstrate new applications and services based on the Parlay/OSA APIs.

What Services does Parlay/OSA enable?

Perhaps the best way of describing the types of services enabled by Parlay/OSA is to look at three example services, which have been developed by third party service developers.

Parlay services in the wireless network

The first service combines information about presence and availability, that is "Alice is in a meeting, cannot take phone calls, but can receive text messages" with the ability to send and receive such messages, and the ability to set up other forms of communications, such as a conference call. This service, which is targeted at business users with advanced mobile terminals, combines the best features of the internet and its instant messaging applications, with the mobile network. A subscriber can see on her mobile terminal, the status of other members of their team, and whether they are reachable. The subscriber also has the option of scheduling a conference call, once all the team members are available.

This service relies on several Parlay/OSA capabilities: Presence and Availability Management, Location, Call Control and User Interaction.

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Parlay services for the Enterprise

Businesses that have regular contact with consumers, want a way of reinforcing their brand image. One way of doing this is with a service that pushes a customised webpage designed to fit on a mobile device, to the caller’s phone during or after the call. A caller who rings up to order pizza receives a "phone-page" that gives details of the latest offers and the numbers to call, as a reminder. The service also applies to business users, who can send an electronic business card with contact addresses and phone number(s) to their callers.

Parlay services in the carrier network

Parlay/OSA can also be used in the fixed network, where a number of wholesale operators are using it to develop service capabilities that are then offered to service providers. The example is from the KPN network in the Netherlands where capabilities such as "connect party A to party B and charge party C" are used as the foundation for a number of telecommunications service offered on behalf of the government. The government sponsor and pay for a service where a pensioner can call-up and ask for a young person who is willing to collect a prescription or some groceries, and this building block is used to enable this service. [ten Brinke 2002]

The Adoption of Parlay

The Parlay Group is a consortium of over 65 companies from the telecommunications and IT industries, which was formed in 1999. The Parlay Group develops and publishes the specifications for a set of open APIs (application programming interfaces) for the telecom network. These interfaces cover capabilities such as call control, user interaction, SMS, Location and Location alerting, Charging, Presence and Availability Management and Policy Management. The Parlay APIs are both network and technology independent: they were designed to work on current fixed and wireless networks as well as IP-based next generation networks. The Parlay APIs have been adopted as part of 3GPP's Open Service Access (OSA), by 3GPP2 and by the Chinese Ministry of Information.

Since the publication of the Parlay/OSA specifications, a number of vendors have developed products that implement, support or use the APIs. These vendors range from the large network equipment providers (Alcatel, Ericsson, Lucent, Siemens, Telcordia) through IT companies (HP/Compaq, IBM, Sun) to specialised telecommunication developers. By the end of May 2003, there were over 150 Parlay/OSA products on the market. See [Lozinski 2003a] for the details.
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Operators such as BT, KPN Carrier Services, Meteor, NTT, Orange, Telecom Italia, Telia Skanova and Telsim are deploying Parlay in their networks to enable the creation of new services. Parlay/OSA is a key element of Hutchison’s 3G wireless network which is now in production in 6 countries. There are trials of Parlay/OSA in over 40 other networks around the world, including Sprint in the USA.

Parlay/OSA enables operators to choose a number of new business models for deploying network services: it facilitates a split between the operation of the core network infrastructure and the provision of value added services.

Implementations of Parlay/OSA
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Parlay’s Evolution

[Figure 4. Evolution of Parlay]

At the end of May 2003, there were over 45 service providers around the world who were either running trials of Parlay/OSA or had deployed the technology. See [Lozinski 2003a] for the details. It is instructive to look at the different areas where Parlay/OSA is being used.

Orange

Orange is a mobile-only operator, with world-wide operations. Orange's view is that Parlay/OSA is one of the elements of the architecture they are deploying to deliver a variety of mobile data and voice services. The capabilities Orange relies on are:

- Call Control [voice calls]
- User Interaction [voice menus, web browsing]
- Mobility [location, presence, availability]
- Terminal Capabilities [handset make, type etc.]
- Data Session Control [GPRS, 3G sessions]
- Messaging [SMS, voicemail, e-mail]
- Connectivity [Connection Quality of Service]
- Account / Charging [payments, prepay etc.]

In April 2003, Orange announced they would be deploying Parlay/OSA platforms world-wide in partnership with AePONA.

Meteor Communications

Meteor is a mobile operator based in Ireland. Meteor was the third operator to be granted a mobile license in Ireland. As a result their principal need is to grow market

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share, which they want to do by delivering a wide variety of innovative services, reducing time to market and increasing ARPU. The Parlay/OSA platform they have implemented is from jNETx, and is intended to speed up the implementation of new services. See [Young 2002] for details. Meteor's experience has been that a Parlay/OSA platform is quick to install and to start offering services - about 6 weeks from project start, and that it is a fast way of delivering new services.

BT

BT was one of the founding members of the Parlay Group. BT is the major fixed network operator in the UK, and is also an MVNO. In April 2002 BT announced that they will enhancing their IN infrastructure to include Parlay/OSA in the SCP, and would be using Marconi’s Application Mediation Gateway. This is intended to simplify the development of new services and to provide vendor independence. BT also envisions Parlay/OSA as a key part of their 21st century network platform. See [Falen 2003] for more information.

The Future of Parlay/OSA

The future development of the Parlay/OSA specifications will continue to maintain and enhance the existing published specifications while maintaining backwards compatibility.

Parlay Web Services

At the same time the Parlay Group, maintaining it’s forward looking approach has been addressing the role of higher level programming interfaces based on web services technology, and the underlying infrastructure required to use web services in a telecommunications environment. In November 2002 the Parlay 4.0 specifications were published with a WSDL binding. In November 2002 the Parlay Group published a series of white papers on the infrastructure for Web Services. [Parlay 2002]

Parlay-X

In April 2003, the Parlay-X specification was published which detailed a set of simple web services that can be used as building blocks for telecom applications. The key design point for all of these web services was simplicity. Parlay-X combines sets of communications functions into useful but non application specific building blocks. The capabilities are restricted to those which can be performed with a single SOAP message exchange, since this simplifies use for the non-professional programmer. The Parlay-X functions are documented in a self-documenting XML DTD interface. [Parlay 2003]

These developments in the web services arena have already led to new liaisons with other industry groups such a PayCircle and the OMA.

Summary

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The Parlay/OSA specifications have been developed over the last 5 years, by an international consortium of vendors and operators, and are a one of the components of third generation mobile systems. They are a key building block for wireless data services both on current networks, and on future 3G networks. Parlay/OSA can also be used in fixed and IP networks, and provides significant advantages in terms of ease of use and speed of service creation in all network types. Parlay/OSA also enables telecommunications network operators and service providers to take advantage of off-the-shelf applications and services and to deploy these quickly, reducing time to revenue. Because Parlay/OSA is based on the same application development technology used in the enterprise it is a simple matter to use it to link business applications to telecommunications services.

With 50 deployments and trials worldwide, and over 150 products implementing the standard, Parlay/OSA is a significant platform for future applications and services in both mobile data and fixed networks.

References

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[Parlay v2]

[Parlay v3]

[Parlay v4]

[Parlay 2002]
[Parlay 2003]
[ten Brinke 2002]

[Young 2002]
Abstract: The new services architecture that is in the process of standardisation is emerging the data and telecom trends into a single stream. Triggered within the telecom industry Parlay, OSA suggests an API-based approach while the Web Services technologies recommend a WWW based service model. OSA/Parlay is an open network API technology that allows application and service providers to define more advanced services using various networks’™ capabilities in a secure (for both application providers and network operators) and open way. There are many ways to visualise these technologies, just as there are many ways to build and use Web services [5]. The following picture provides one illustration of the Web Services stack families. OSA Parlay/Parlay X Gateway. Service Interaction Management. © AePONA. Enabling new services to co-exist with old Bringing services to pre-paid subscribers. End to end solutions in mobile, fixed & converged networks. Wide range of application and development partners. Large regional mobile alliance in Asia Aims to create ubiquitous services for all member company. subscribers deployed & managed centrally. Using Causeway Parlay/Parlay X as primary application interface Messaging (and gaming) in phase 1 Expanding to other capabilities, such as call control solutions. © AePONA. Is all about Service Solutions. Voice Services critical to Telecom Operators’™ Strategies Will continue to account for 75%+ of Revenues. Parlay/OSA services using WebSphere Studio Application Developer. Telecom Web services for servers and client applications using WebSphere Studio Application Developer. Support for Java® and Parlay/OSA API technologies; based on open programming and telecom standards. Independent software vendors (ISVs) The Telecom Toolkit offers new ways to extend existing applications with more advanced telecommunication features. ISVs can learn more about the server and toolkit and get. Creating Telecom Web services. Until now, building applications and services that access or extend the telecommunication networks was very difficult. It requires a select set of skills, and knowledge of various pieces of equipment and a variety of telecom protocols.