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SyncML Over Bluetooth

Abstract:
This document explains how SyncML over Bluetooth synchronisation can be accomplished, and describes the interoperability improvements this brings

Revision History

Revision	Date	Comments
0.3	4th May 2001	Draft for review
0.4	25th May 2001	Updated with comments from SyncML initiative
0.4b	25th May 2001	Spelling and grammar checked
0.5	30th May 2001	More updates
0.6	12th June 2001	Updated with comments from Bluetooth SIG
0.7	18th June 2001	Copyright notice updated
0.8	31st July 2001	Update with comments from BARB review (more neutral wording towards other Synchronisation protocols and transports)
0.9	8th August 2001	OBEX and IP alternatives presented more equally

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Bluetooth Architecture Review Board (BARB)

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1 Introduction

It is quite common today for an average mobile worker to have several mobile devices to enhance his productivity. With the industry-wide proliferation of mobile devices and the evolution of these devices into a major means of information exchange, the mobile worker will wish to have the all his information synchronised between his mobile devices and his networked applications.

At the moment, almost every device and application has its own proprietary technology for performing data synchronisation. These proprietary technologies only function with specific devices, systems and data types.

The ability to connect and synchronise devices conveniently on-the-fly is the key for fulfilling the promise of pervasive mobile computing.

Bluetooth is emerging as the short-range connection media of choice amongst mobile devices and electronic equipment, giving the user ease of operation. There are no cables to attach, nor any infrared ports to carefully line up.

However, Bluetooth on its own is not a complete solution. A common synchronisation protocol is also needed to ensure that meaningful connectivity is not limited to devices from only one manufacturer.

SyncML is an open industry initiative that was founded to develop and promote an open data synchronization protocol. SyncML is an extensible and transport independent technology that allows the device to support a single synchronisation standard for both local synchronisation over Infrared, Bluetooth and USB as well as remote synchronisation over Internet, WAP and iMode.

2 Background of Synchronisation in Bluetooth

Synchronisation is one of the most important application areas for Bluetooth. During the preparation of the first Bluetooth specification, synchronisation was considered to be a key usage scenario for Bluetooth.

However, the Bluetooth SIG did not want to create a new synchronisation protocol only for Bluetooth synchronisation. After the evaluation of existing synchronisation technologies at the time, the Bluetooth SIG chose to include IrMC synchronisation protocol [4] to the Bluetooth specification. The main reason for the decision was the fact that IrMC was the only open synchronisation technology available at the time.

The Bluetooth specifications up to, and including 1.1, included a Synchronisation Profile that is based on IrMC.

However, many of the companies in the Bluetooth SIG already had proprietary synchronisation solutions. Because of this they did not want to implement also IrMC-based synchronization. Bluetooth SIG decided to remove synchronisation from the strict Bluetooth compliance requirements [6] and allow the market to drive the synchronization technology development. The adoption of IrMC synchronisation over Bluetooth since has been low.

Many of the companies that were originally involved in developing the IrMC standard went on to develop a more advanced, extensible and future-proof synchronisation technology, SyncML.

The acceptance of SyncML both in the market and in the standardisation bodies has been high. SyncML has been endorsed by over 600 companies and several standardisation bodies, including 3GPP and the Infrared Data Association (IrDA), which originally created the IrMC standard.

3 SyncML

SyncML is an open industry initiative for developing and promoting a common data synchronisation protocol. The SyncML protocol has been developed by some of the leading companies in their sectors, Ericsson, IBM, Lotus, Matsushita Communication Industrial Co., Motorola, Nokia, Palm Inc., Psion and Starfish Software; together with over 600 SyncML Supporter companies.

The SyncML 1.0 specification [3] was published in December 2000 and has since then been endorsed by several other standardisation forums as their preferred choice of synchronisation technology. The first products passed the rigorous SyncML conformance and interoperability testing processes in April 2001.

3.1 What Is SyncML

SyncML is a synchronisation protocol that can be used by devices to communicate the changes that have taken place in the data that is stored within them. However, SyncML is capable of delivering more than just basic synchronisation; it is extensible, providing powerful commands to allow searching and execution.

SyncML uses mark-up language documents to exchange information about the changes, as well as the changed data itself. These documents are transferred in a sequence defined by the SyncML specification.

Typically, one of the devices is a mobile terminal, and is called the synchronisation client, and the other is a server. The mobile device and the server can communicate the changes that have occurred since the last time that they synchronised.

The capabilities of the mobile client and the server may be very different. It is not unusual, due to the limitations of the mobile device, for the server to contain more data fields per item than the client. SyncML will make the data as identical as possible on the devices.

For more details see the SyncML specifications [3].

3.2 What are the Main Benefits

The main benefits of using SyncML as a synchronisation protocol are:

- Since it is based on XML, there are no operating system or programming language constraints.
- SyncML is a future proof choice. It is easily extensible to respond to the future data synchronisation needs.
- As the synchronisation solution for major wireless device manufacturers, SyncML enabled devices will quickly reach mass volumes.
- Many different transport bindings are available, so this means the same synchronisation technology can be used for both local and remote synchronisation utilising whichever connection is most suitable.
- 3GPP have adopted SyncML as the standard for wide area synchronisation in Release4. IrDA have adopted SyncML as the synchronisation solution for their next evolution of IrMC. WAP Forum is also considering adopting SyncML. This will increase interoperability between devices as the same synchronisation standard will be used everywhere.

4 SyncML Using Bluetooth

SyncML is a transport independent technology, thus it can support most of the currently used wireless and cable based transports. As SyncML is commonly used over session level protocols, an OBEX-based or IP-based transport solution can conveniently be utilised when running SyncML over Bluetooth.

The OBEX binding for SyncML specification [1] defines how SyncML is mapped onto the OBEX layer. This specification contains the details that are normally contained in a Bluetooth profile.

The SyncML specification also defines how to run SyncML over HTTP and WSP. In this case, the transport solution would smoothly work over the TCP/IP protocols e.g., using the Bluetooth PAN profile.

4.1 Bluetooth Profile Structure

In the following figure, the Bluetooth profile structure and the dependencies of the profiles are depicted. A profile is dependent upon another profile if it re-uses parts of that profile, by implicitly or explicitly referencing it. Dependency is illustrated in the figure: a profile has dependencies on the profile(s) in which it is contained - directly and indirectly. E.g., the SyncML OBEX Binding is dependant on the Generic Object Exchange, Serial Port, and Generic Access profiles. For more details on the Bluetooth Profiles see reference [5]. Or if the IP-based solution is utilized, the PAN profile can be used as a basis.

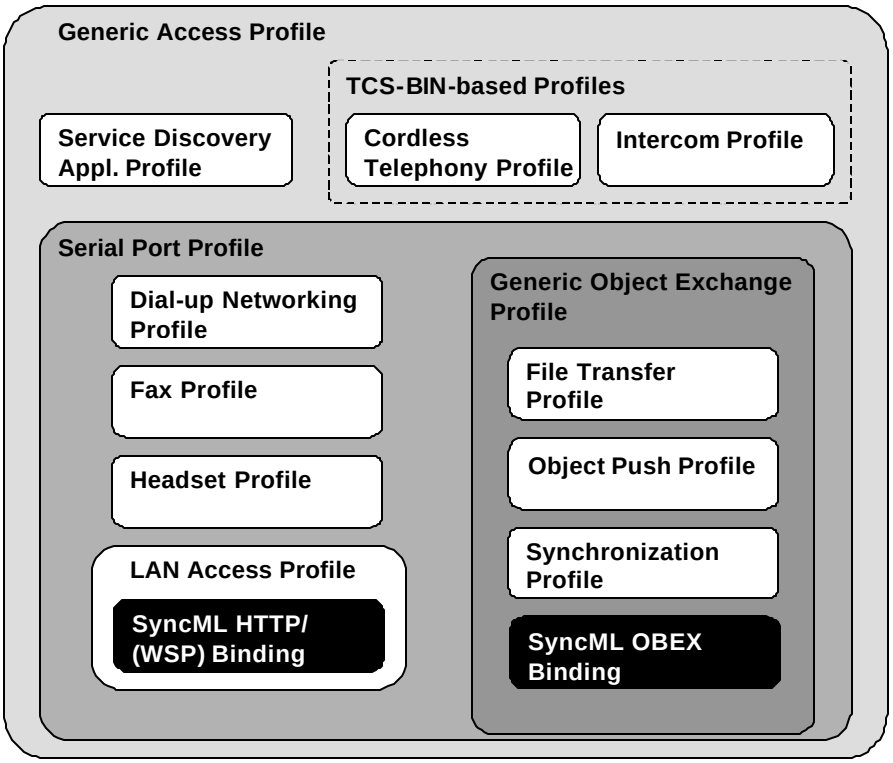

Figure 1: OBEX Mapping in the Bluetooth Profile Architecture

4.2 The OBEX Binding

The following figure shows the protocols when SyncML and OBEX are run over the Bluetooth protocol stack.

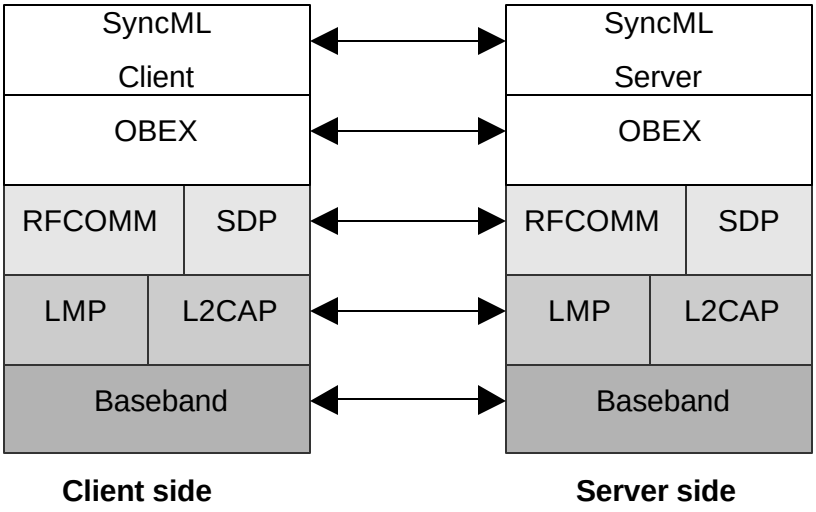

Figure 2 SyncML using OBEX over Bluetooth

The OBEX binding for SyncML [1] specification defines how SyncML should work using OBEX over Bluetooth. Please refer to this specification for details on the mapping.

The specification includes definitions for the

- SDP record entries
- Mapping of SyncML documents and actions onto OBEX Commands/Responses
- Mandatory/Optional OBEX Commands/Responses
- OBEX Target UUID for SyncML

5 Conclusion

5.1 High Momentum and Bluetooth Compatibility

- SyncML is an open industry standard. The SyncML specification is publicly available at www.syncml.org. Any company can join SyncML Initiative as a supporter member to be involved in the further development of the SyncML technology. SyncML Initiative provides the companies with testing and application development tools, and aims to ensure device interoperability independent from manufacturer. This allows all the companies involved to stay in the front line of local connectivity synchronisation.

- SyncML has gained the support of over 600 companies. Tens of companies, both small and large, are actively developing products supporting SyncML. This means that a device that supports SyncML will instantly have a large base of 3rd party products to interoperate with.

- More and more standards bodies and key industry players are recognizing SyncML as the protocol of choice for both local and remote synchronisation. SyncML has been adopted by the 3GPP and IrDA organisations. This allows manufacturers to use a single synchronisation solution for their local and remote interfaces. For example, a device may already support SyncML over WAP, thus adding support for using SyncML over Bluetooth will minimise code size and development/test time.

- SyncML supports OBEX, which is a core profile of Bluetooth. SyncML is just an application on top of OBEX. The SyncML Initiative has created a document that shows how SyncML can be used over OBEX.

5.2 Future Development

Currently a suitable method for using SyncML over Bluetooth is to use the OBEX binding, and RFCOMM as defined in the GOEP [5].

The Bluetooth PAN WG is working on a profile, which will allow the routing of IP packets. This means that in the future, SyncML can also use the HTTP or WAP bindings across PAN natively and not only using the dial-up networking based IP solution.

6 References

[1] SyncML Over OBEX
http://www.syncml.org/downloads.html

[2] SyncML WEB Site
http://www.syncml.org

[3] SyncML initiative, SyncML Technical Specifications
http://www.syncml.org/downloads.html

[4] IrMC, Infrared Data Association
"Specifications for Ir Mobile Communications (IrMC)", version 1.1, 01 March 1999, plus all applicable errata. (http://www.irda.org/)

[5] Bluetooth SIG, Bluetooth Specifications
V1.0, July 1999
Bluetooth: (http://www.bluetooth.com/)

[6] Bluetooth Qualification Program PRD
Bluetooth: (http://www.bluetooth.com/)

7 Acronyms And Abbreviations

Abbreviation or Acronym	Meaning
3GPP	3rd Generation Partnership Project
GOEP	Generic Object Exchange Profile
IrDA	Infra-red Data Association
IrMC	IrDA subgroup concerned with Mobile Communications
L2CAP	Logical Link and Control Adaptation Protocol
LMP	Link Manager Protocol
OBEX	Object Exchange Protocol
RFCOMM	Serial Cable Emulation Protocol
SDP	Service Discovery Protocol
SyncML	Synchronisation Mark-up Language
PAN	Personal Area Network
UUID	Universally Unique Identifier (normally a 128 bit number)
WAP	Wireless Application Protocol
XML	Extendable Mark-up Language