

A Study of the Interoperability Service Framework for Bluetooth and Jini

鄭玄哲、江憲坤

E-mail: 9222604@mail.dyu.edu.tw

ABSTRACT

With the Internet and advanced technologies gaining ground, the IAs (Information Appliances) are increasingly popular. Although there are various IAs to provide services for people, sometimes they can not share the services with each other because of the different communication protocol, such as Jini and Bluetooth. Jini technology is an open architecture that enables developers to create network-centric services and makes the services have auto-discovery capability. Bluetooth technology works on the hardware that complies with the Bluetooth wireless specification. It enables to auto-discovery and link among portable devices and connects to the Internet. However, Jini and Bluetooth services can not communicate with each other because they lack a standard interface and common protocol. Thus, this research studies Jini and Bluetooth technologies to design a standard interface and builds a interoperability service framework to bridge the gap between Jini and Bluetooth. The proposed framework enables to exchange the services between these two technologies and provides for developers to create a Jini-Bluetooth service gateway rapidly. Therefore, a Jini-Bluetooth service gateway based on the proposed framework is designed and implemented as a proof-of-concept example of this research.

Keywords : Bluetooth, Jini, service framework, service information, service exchange

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REFERENCES

- [1] 禹帆，無線藍芽技術深入探討最新版，文魁資訊股份有限公司，民國90年。
- [2] 陳逸興，資訊家電之消費價值研究，國立交通大學經營管理研究所碩士論文，民國89年。
- [3] 張裕益譯 (Booch, G., Rumbaugh, J. and Jacobson, I. 著)，UML使用手冊，博碩文化股份有限公司，民國90年。
- [4] 李于青譯 (結城 浩著)，Design Patterns 於Java語言上的實習與應用，博碩文化股份有限公司，民國91年。
- [5] 徐國偉，HAVi與Jini之間軟體閘道器的設計與實作，台灣大學資訊工程學系暨研究所碩士論文，民國90年。
- [6] 趙光正、薛琇文譯 (Scott, F.著)，UML精華第二版標準物件模型語言概述，碁?資訊股份有限公司，民國90年。

- [7] Affix, <http://sourceforge.net/projects/affix>, 2001.
- [8] AXIS OpenBT Stack, <http://developer.axis.com/software/bluetooth>, 2001.
- [9] Bluetooth Special Interest Group, The BluetoothSpecification, <http://www.blueooth.com/developer/specification/specification.asp>, 2000.
- [10] BlueZ, <http://bluez.sourceforge.net/>, 2001.
- [11] BlueDrekar, <http://www.alphaworks.ibm.com/tech/bluedrekar>, 2000.
- [12] Booch, G., "The Visual Modeling of Software Architecture for the Enterprise," <http://www.therationaledge.com/rosearchitect/mag/archives/9810/f1.html>, 1998.
- [13] Dodge, D.S., "Gateways-101," in the Military Communications Conference, MILCOM 2001, vol. 1, pp. 532-538, 2001.
- [14] Dimitar, V. and Ivailo, F., "Service Gateway Architechure for a Smart Home," IEEE Communications Magazine, pp. 126-132, 2002.
- [15] Edwards W. K. and Tom R., Jini Example by Example, Prentice Hall Pub., 2001.
- [16] Edwards W. K., Core Jini, Prentice Hall Pub., 1999.
- [17] Fayad, M. and Schmidt, D.C., "Object-Oriented Application Frameowrks," Communications of the ACM, vol. 40, no. 10, pp. 32-38, 1997.
- [18] Gamma, E., et al., Design Patterns, Addsion-Wesley Pub., 2000.
- [19] Jennifer, B., Brian S. and Gordon M., Bluetooth Application Developer's Guide, Syngress Media Pub., 2001.
- [20] JBlueZ, <http://jbluez.sourceforge.net/>, 2002.
- [21] Johnson, R.E. and Foote, B., "Designing Reusable Class," Journal of Object-Oriented Programming, vol. 1, no. 2, pp. 22-35, 1988.
- [22] Kasper, S. and Buhner, L., Jini Discovers Bluetooth,
http://www.tik.ee.ethz.ch/~beutel/projects/sada/2002ss_sa_vincent_bt_jini_assignment.pdf, 2002.
- [23] Richard, G.G.III, "Service advertisement and discovery: enabling universal device cooperation," IEEE Internet Computing, vol. 4, no. 5, pp. 18-26, 2000.
- [24] RMI, <http://java.sun.com/j2se/1.3/docs/guide/rmi/activation/activation.1.html>, 1999.
- [25] Sun Microsystems, Jini Network Technology, <http://www.sun.com/jinni>, 2001.
- [26] UML, <http://www.omg.org/uml/>, 1997.
- [27] Widcomm SDK, <http://www.widcom.com/>, 2002.