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## Position Paper – Binary Interchange of XML Information Item Sets

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### 1 Introduction

TeliaSonera studies the use of Web Services technology—also Semantic Web technology—to implement new nomadic services in various application fields. The research carried out has shown that one of the major shortcomings preventing Web Services technology to be used in wireless environments is the highly verbose representation of XML. In many cases it may cause performance of wireless data transfer to be totally unacceptable, and thus it may prevent totally the wide-scale use of Web Services technology in wireless environments. Therefore, it is of primary importance to develop a standardized, compact representation of XML. Otherwise, the role of Web Services technology (as well as, XML in general) will be rather limited in wireless applications, even though it would be beneficial from other aspects.

### 2 Requested Information

#### 2.1 1 What work has your organization done in this area?

TeliaSonera has studied the feasibility of using Web Services technology in the wireless environment. So far, we have concentrated on quality of service issues; therefore, we have done performance measurements using SOAP messages. The measurements concentrated on the (slow) wireless network connections, such as GPRS, and XML parsing on the mobile devices. For more detailed information about the test cases, test environment, and equipment, please see the article *Web Services in Wireless Networks — What Happened to the Performance* published in ICWS'03 (June 23 - 26, 2003 Monte Carlo Resort, Las Vegas, Nevada, USA). The main result was that the data transfer across wireless wide-area networks is the main bottleneck; it dominated the whole invocation time and although the mobile devices were as low-end as mobile phones, the parsing times didn't create such a problem.

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**2.2 2. What goals do you believe are most important in this area?**

The most important goal in our opinion is to reduce the amount of bits to be transferred across wireless links. The next one is reducing the parsing times. Although the throughput of wireless links will become better, wireless data transmission will be the main bottleneck in nomadic Web Services. In fact, it could be easily assumed that the progress of the handheld devices (and thus the performance in terms of CPU and memory) will be far greater than the increase of throughput of wireless links. Therefore, we should concentrate on the things that happen while transferring the XML files across wireless wide-area networks.

**2.3 3. What sort of documents have you studied the most?**

So far, we have concentrated on small SOAP documents ranging from 1 Kbytes to 13 Kbytes.

**2.4 4. What sorts of applications did you have in mind?**

TeliaSonera studies various nomadic applications providing services in the wireless environment both for B2B and for B2C business domains. Therefore, the application arena is wide and TeliaSonera does not currently concentrate on any particular application. This means that we are looking at transferring XML messages on both the wireless network side and the fixed network side, but we are mainly concentrated on the wireless part. From the XML documents we are focusing on Web Services invocations, that is, transferring SOAP messages over the wireless.

**2.5 5. If you implemented something, how did you ensure that internationalization and accessibility were not compromised?**

Currently, TeliaSonera is not yet in the implementation phase, but doing studies on feasibility of using XML-based technology in the wireless environment and research on improving the technology in co-operation with Helsinki Institute of Information Technology (see the position paper "Byte-efficient Representation of XML Messages" written by Jaakko Kangasharju and Kimmo Raatikainen).

**2.6 6. How does your proposal differ from using gzip on raw XML?**

See chapter 5.

TeliaSonera used raw XML and gzipped XML in the performance measurements and compared their performance together with persistent and non-persistent network connections.

**2.7 7. Does your solution work with any XML? How is it affected by choice of Schema language? (e.g. W3C XML Schema, DTD, Relax NG)**

See chapter 5.

**2.8 8. How important to you are random access within a document, dynamic update and streaming, and how do you see a binary format as impacting these issues?**

There is no unambiguous way to express the importance of these methods, as it depends very much on the application field. What we see with transferring XML is that we are transferring a document, which the other peer accesses to extract the information from it. Therefore, random access is important. Dynamic updating may not be so important in the first applications in the wireless domain. Streaming may be important, if it can be used to reduce the required bandwidth. It would be interesting to know how the "block" transfer and streaming of XML documents differ in performance, when applied in the slow wireless networks.

**3 Summary**

Web Services technology is promising technology to implement wireless services, but before it really can be deployed in a wide scale, there must be a standardized, compact representation of XML. Otherwise, the performance of services implemented with Web Services technology is not adequate and acceptable by nomadic users. TeliaSonera strongly supports the development of a such representation of XML.

However, doing something only on the XML messaging does not solve all the problems; the network communication protocols need to be used "wisely" in slow wireless networks, and perhaps even optimize them.