NPE. As a first step, the set of SOAP element tags can be codified as application-specific tags, as provided by WBXML [11]. This approach has drawbacks, in particular that it largely

Table 1. Message Size (bytes)

Service	Original message size	DiffEnc	Jzlib	WBXML	WSOAP (NPE only)	WSOAP (NPE+ WAE)
CricScore Request	516	292	264	464	138	42
CricScore Response	34,266	182,812	2,140	22,562	11,095	7,205
Stock Quote Req	335	429	231	272	149	53
Stock Quote Res	10,257	88,293	1,606	4,166	3,925	3,278

defeats the purpose of XML namespaces. NPE, in contrast, exploits the fact that within any given document, the choice of a specific prefix string to denote association with a namespace is arbitrary. For example, within a document, the tags <soap:Envelope> and <s0:Envelope> are equivalent as long as the prefixes soap and s0 are associated with same namespace.

WAE. If the gateway and the mobile client both have access to the WSDL for each Web Service interface used by the client application, the WSDL can be analyzed to create the requisite coding tables. We propose a protocol for synchronizing the WSDL coding tables in the gateway with the client. See Fig. 2.

3. EXPERIMENTS AND RESULTS

Our experiments used the following freely available software: for Jzlib [14]; for WBXML, we used KXML [9]; for DiffEnc, we used diffxml [3]. All implementations were written in pure Java, running under JRE 1.4.2 with Windows XP SP1 on a Pentium (M) 2.79 GHz machine with 496 MB RAM. For workload, since there is no common accepted SOAP benchmark available, we chose two example messages, a cricket score service [1] and a stock quote service. See Table 1 for results.

We see that WSOAP can reduce message size by 3x-12x compared to SOAP. It outperforms DiffEnc and WBXML by large factors; in some cases DiffEnc in fact results in message size explosion. However, WSOAP only outperforms Jzlib for messages that consist largely of structured XML. For messages

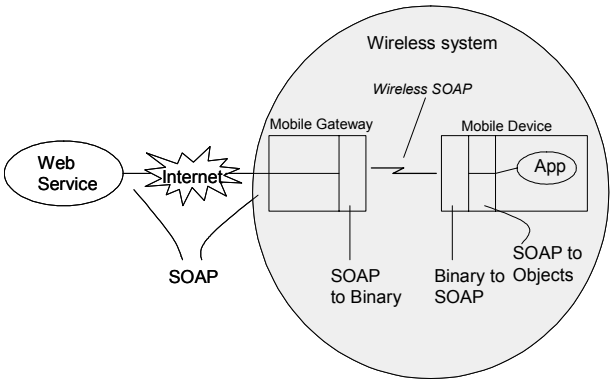

Figure 1. Scope of WSOAP implementation.

that consist largely of unstructured text data (such as SOAP response messages) Jzlib achieves 2x-3x better compression than WSOAP. While computation time results are omitted in this summary for brevity, we find the superior compression of Jzlib comes with significant increases in computation time.

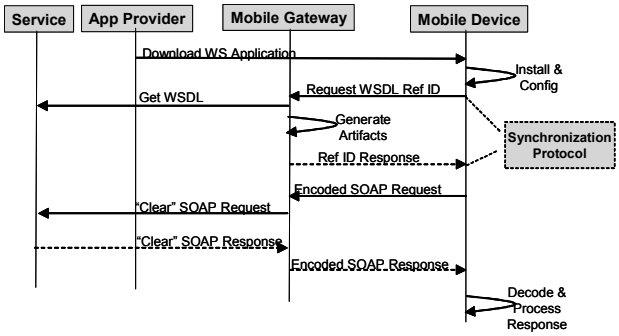

Figure 2. WSOAP WSDL-aware synchronization protocol.

4. FUTURE WORK

Future efforts planned for WSOAP include: (1) hybrid techniques to merge the advantages of generic compression and SOAP-aware compression; (2) automated WSDL analysis; and (3) application to other XML-based and WS-* protocols.

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