Client-Server Protocol

Transport Bindings

V1.1

WV Internal Tracking Number: WV-024

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1. REVISION HISTORY

Date	Issue	Description	Author
February 13th	TBD	Initial release	WV TechComm
July 31, 2002	V1.1	Version 1.1	WV TechComm

2. REFERENCES

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[TS 23.040] "Technical Realization of the Short Message Service (Release 4), 3GPP TS 23.040 v4.4.0", 3rd Generation Partnership Project, September 2001

[SOCKS] SOCKS Protocol Version 5. M. Leech, M. Ganis, Y. Lee, R. Kuris, D. Koblas, L. Jones. RFC 1928. March 1996.

[TCPTunnel] Luotonen, A., "Tunneling TCP based protocols through Web proxy servers"

3. ABBREVIATIONS

CIR	Communications Initiation Request
CSP	Client-Server Protocol
HTTP	Hypertext Transfer Protocol
SMS	Short Message Service
WSP	Wireless Session Protocol
WV	Wireless Village

4. INTRODUCTION

This document describes the binding of the session and transactions to different transports. This document describes four bindings: WSP [WAPWSP], HTTP [RFC2616], HTTPS and SMS [TS 23.040]. In addition, it defines the use of a Communications Initiation Request (CIR) used to initiate communication process between server and clients.

A WV client and server *must* support at least one transport binding, either WSP or HTTP or HTTPS or SMS. The server support for WSP can be implemented by using a WAP Gateway in front of the server and then use HTTP communication between the WAP Gateway and the WV server. The support for CIR is recommended to avoid polling in case of the WSP, HTTP or HTTPS bindings.

5. LOGICAL MODEL OF COMMUNICATIONS

Logically the WV transport binding is divided into two channels: a mandatory *data channel* in which all the exchange of CSP primitives is done and an optional *CIR channel* used to activate the data channel whenever the data channel is not established, or the communication is halted in the data channel and needs to be reactivated. Both channels are depicted on Figure 1.

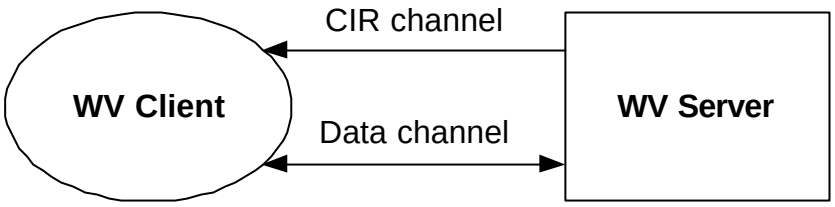

Figure 1. Logical Model of Communications

The need and use of a CIR channel depends on the protocol and bearer used in data channel. The protocol bindings in data channel are WSP, HTTP, HTTPS and SMS. In case of WSP, HTTP and HTTPS, the communication is asymmetric, i.e., it always originates from WV client to the server. Thus, the client can always start a transaction from the client to the server. If the WV server needs to start a transaction, there are three alternatives:

- The server inserts the transaction request into a response message for a pending transaction from the client to the server
- The server sends a communication initiation request message through CIR channel to the client in order to request an immediate poll message from client to server. The transaction request is then inserted into the response part of the poll request.
- If CIR channel is not available, the client needs to poll the server in order to allow the server to insert a server-originated transaction request into the poll response message.

In addition to the use described above, the CIR channel is also used to establish the data channel when the channel is not available. For instance, if a TCP/IP connection for the data channel has been disconnected, or the PDP context in 2.5G or 3G mobile networks is not allocated, the CIR channel is used to reestablish the channel connection to the server.

In case of polling, the server defines the mandatory minimum interval for the WV client polling. It is recommended for the client to implement an adaptive polling policy. Normally, when polling requests return some CSP primitives (requests or responses), client needs to initiate next polling request after the minimum interval, but in case of empty responses it should gradually increase the polling intervals (up to 10 seconds or more). This would significantly decrease the server load and reduce unnecessary network traffic.

In the SMS technology, both the client and server can originate transactions and the data channel is always available. Thus, separate CIR channel is not needed.

6. WV SESSION AND CHANNEL MANAGEMENT

The WV session and transaction models are independent of the WV transport binding and the underlying bearer protocols. The WV session does not require persistent underlying bearer for the data channel. The TCP/IP connection or WSP session may be disconnected during the session for performance reasons or it may be lost for some other reason. If disconnected, the client reestablishes the connection when it needs to send a request or when it receives the CIR.

The CIR channel is a push-type channel that is either connectionless, or connection-oriented. If the channel is connection-oriented, the connection needs to be persistent (for the duration of a session).

The relation of the channel connections and the WV session is illustrated in Figure 2.

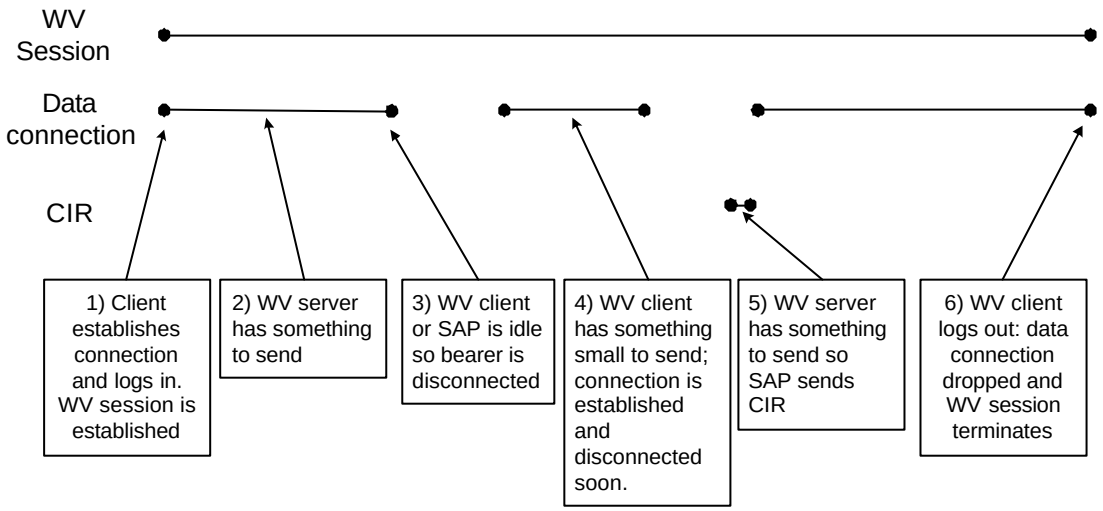

Figure 2. The relation of the WV session and bearer.

7. TRANSPORT BINDING FOR WSP/HTTP/HTTPS DATA CHANNELS

7.1 OVERVIEW

The CSP transport binding alternatives for data channel are HTTP 1.1, HTTPS, WSP 1.2 or WSP 2.0. In HTTP and HTTPS binding, the bearer protocol in data channel is TCP/IP. For WSP bindings, the bearer protocol alternatives are described in WAP specifications. There is no requirement for persistent bearer connection.

The bearer connection for the data channel is always set up from the WV client to the WV SAP.

7.2 WSP/HTTP ENCAPSULATION OF CSP TRANSACTIONS

The WSP and HTTP(S) are both asymmetric, client-server protocols, in which requests always originate from the client and responses from the server. In WV transactions, however, there is a need for symmetric transactions: the requests may originate from client or server.

The encapsulation of symmetric CSP transactions to asymmetric WSP/HTTP(S) methods is based on the use of WSP/HTTP(S) POST method only. The WSP/HTTP(S) POST-request, POST-response and the CSP transactions are completely separated. Each WSP/HTTP(S) POST-request may contain at least one CSP transaction request or CSP transaction response message. Similarly, each WSP/HTTP(S) POST-reply may contain at least one CSP transaction request or CSP transaction response message.

If the WV client supports more than one CSP request or response within single HTTP(S) POST request or response, it is indicated during the client capabilities negotiation procedure.

For each transaction at POST-reply, the WV server indicates whether (for server reasons) the next POST request is needed. If it is needed, but the WV client has nothing to send, the client shall WSP/HTTP(S) POST request with CSP PollingRequest primitive as content. Similarly, if server has no WV transaction request or reply to be sent to the WV client, the WSP/HTTP(S) POST response should contains no content and the 200 OK response code.

This communication continues until neither WV client nor the server has CSP primitives to send. In such a case, the communication grinds to a halt. If, at this point, the WV client has something to send, it simply issues a WSP/HTTP(S) POST with the CSP transaction request.

If server needs to send any data (CSP request or response) to the particular client, first the server has to send a Communications Initiation Request to that client which is a signal to the WV client to initiate WSP/HTTP(S) POST with CSP PollRequest primitive as content.

Examples of the mapping of the message flow for the CSP SendMessageRequest and MessageNotification transactions are depicted on Figure 3.

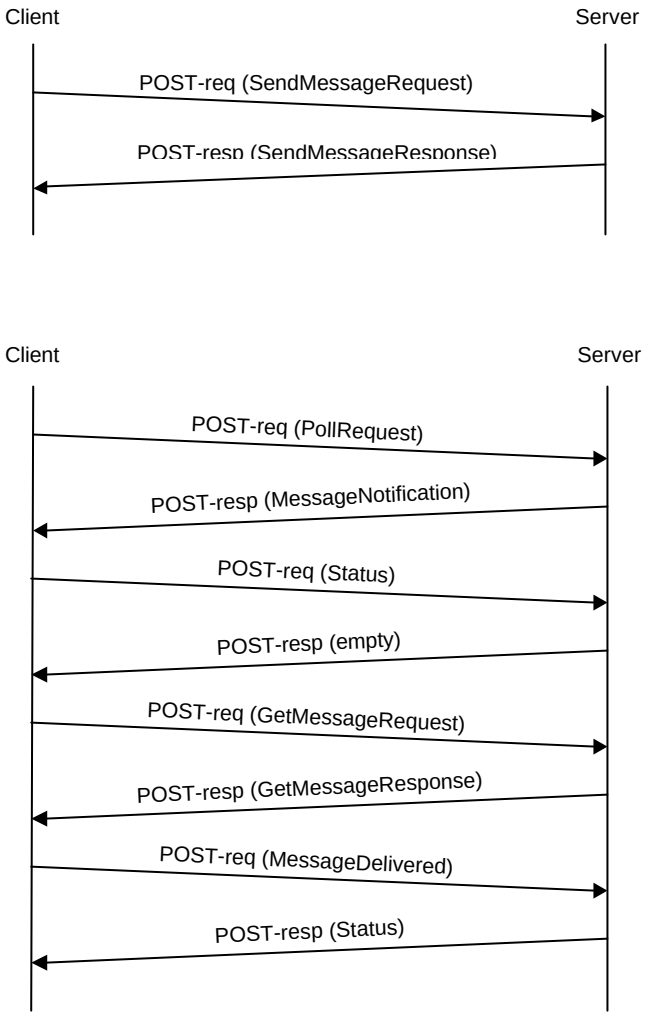

Figure 3. Examples of mapping of WV CSP transactions to WSP/HTTP(S)

7.3 ACCESS POINT DEFINITION

For WAP/WSP bindings, the access point towards WV SAP requires the WAP access point and the URL of the WV SAP.

For HTTP(S) binding, the access point towards WV SAP requires the general ISP access point for TCP/IP and the URL of the WV SAP.

The URL used in WAP/WSP and HTTP(S) bindings may contain a non-empty path and a non-standard port number.

7.4 REDIRECTION

The WV client that uses HTTP binding must understand standard HTTP redirection codes [RFC2616] and associated information headers. HTTP redirection mechanism allows a WV server to redirect clients to other servers or other parts of the same server based on load or session related information.

7.5 MANDATORY HTTP HEADERS

The support for the following HTTP headers is mandatory for both client and server implementations: Content-type, Content-Length, Connection and Location (in case of redirection).

8. TRANSPORT BINDING FOR CIR CHANNEL

8.1 TRANSPORT ALTERNATIVES AND MESSAGE FORMAT

The CIR channel is a push-type channel that can be implemented as connectionless or connection-oriented channel. The purpose of the CIR channel is to carry communication initiation requests from the server to the client only. It does not carry any CSP primitives.

For the CIR channel, the following bindings are defined:

- WAP 1.2 or WAP 2.0 push using WSP unit push message and SMS as a bearer
- WAP 1.2 or WAP 2.0 push using WSP unit push message and UDP/IP as a bearer
- Standalone UDP/IP binding
- Standalone TCP/IP binding

The WV client may support one or more CIR channel bindings that are indicated in the client capability negotiation defined in CSP. The client may also support no CIR channel at all, which then requires polling of request and responses from the WV server.

If CIR channel is connection-oriented, the connection of CIR channel and data channel are independent of each other.

In general, the bindings of CIR channel and data channel are independent. However, if the binding for data channel is WSP, the CIR channel binding must use WAP 1.2/2.0 CIR bindings. There is no standalone SMS binding for CIR channel.

The communication initiation request message is textual message in the following format:

WVCI <CSP-version> <Session-cookie>

Where:

- CSP-version is the version number of the WV specification. Major version and minor version numbers are separated by the dot (“.”).
- *Session-cookie* is the client-defined session cookie generated at every client login.

The encoding is UTF-8 Unicode Basic Latin (US-ASCII)

8.1.1 WAP Push Binding

To be able initiate a WAP Push request, the WV server must be provisioned with an address of WAP PPG and support WAP Push Access Protocol. The WV server uses the push submission operation to send CIR to the terminal. Each push message should contain one CIR. Content type of the content entity of a PAP request is “application/vnd.wv.csp.cir”.

The use of WAP Push does not require that the WV client has active PDP context. The Push Proxy Gateway may use a SMS bearer to send the initiation request or, if a PDP

context is already active and the IP address is known, it may push the message over TCP or UDP.

The WV client in a mobile handset may provide its mobile number in the CSP protocol login transaction (as a part of Client ID). If the mobile number is not present, the WV SAP must be able to obtain the mobile number if it is required.

8.1.2 Standalone UDP/IP Binding

In the case of a standalone UDP/IP binding, the WV server sends the client the CIR messages enclosed in UDP datagrams. Each UDP datagram contains exactly one CIR message. To use this binding, WV client must be able to receive UDP datagrams directly from the WV server.

The WV client may accept the CIR request either to default UDP port defined in this document or to provide the UDP port in the capability negotiation phase of client login.

Due to the small size of the CIR message, it is guaranteed that the UDP will not be fragmented or rejected because of size.

8.1.3 Standalone TCP/IP Binding

TCP/IP binding uses a persistent connection from the WV client to server to provide a low-latency always-on CIR channel.

The WV client is responsible for setting up the TCP/IP connection and maintaining its persistency.

The WV client opens the CIR TCP/IP connection to the server right after a successful login procedure including client capability and service negotiation. The IP address and port for the CIR channel are provided by the server in the capability negotiation. The IP address and port are valid throughout the session.

As soon as a connection opens, the client must send the authentication message “HELO” with Session ID as a parameter. This allows the WV server to associate the new TCP/IP connection with one of the existing sessions. If the WV server does not receive a “HELO” message in 10 seconds after a new connection has been opened from the client or the received Session ID is unknown, the server must terminate the connection. The WV server replies to the client’s “HELO” message with an “OK” message. The client is not allowed to open more than one connection to the WV server.

In some cases a TCP/IP connection may be closed by the intermediate network entities, or a connection may be broken due to network problems. To prevent this from happening or to be able to recover, the WV client should periodically send “PING” messages over an opened connection to determine if it is still available. The server must respond to these messages with the “OK” message. If client doesn’t receive an “OK” message or detects that the connection is broken, it must open a new TCP/IP connection and send the “HELO” message again.

When a server has any data (CSP request or response) that needs to be sent to the client, it sends a CIR message over the TCP/IP connection associated with this client.

All client and server originated messages must be terminated with a <CR><LF> (carriage return, line feed) sequence.

The encoding is UTF-8 Unicode Basic Latin (US-ASCII)

The connection establishment for a standalone TCP/IP binding for CIR channel may not work directly when the WV client is behind a firewall or proxy. The technology alternatives to facilitate the connection initiation and management are:

HTTP Tunnelling [TCPTunnel]

SOCK4

SOCK5

An example of data traffic on the TCP/IP-based CIR channel ("C→S" indicates client originated messages, "S→C" indicates server originated messages) is:

<client opened TCP/IP connection to the server>

C→S: HELO abcd123

S→C: OK

S→C: WVCI 1.0 cookie123

C→S: PING

S→C: OK

<client closes TCP/IP connection>

9. SMS TRANSPORT FOR MOBILE CLIENTS

The SMS transport bindings use the GSM short message technology to facilitate the WV transactions. In the transport binding, the WV client and the short message service center must support both mobile-originating (MO) short messages as well as mobile-terminating (MT) short messages. Due to the symmetric nature of SMS transport, the CIR channel is not needed.

The message encoding for the SMS binding is based on separate the SMS binding document.

9.1 OVERVIEW

In the SMS transport binding, the WV client communicates with the WV SAP through a SMSC. The CSP transactions and session document [CSPTRANS] as well as and the relevant SMS binding document [SMSBIND] describe the SMS application level communication.

The SMSC must be able to route the messages from the WV client to the WV SAP. For this purpose, the short message is sent to a recipient that identifies the WV SAP as a special, IN-type number. The SMSC must have the capability to route messages using this special number to the WV SAP. When the WV SAP sends a message to the WV client, the SMSC is able to deliver the message directly when the recipient is identified with a mobile number. The architecture is depicted in Figure 4.

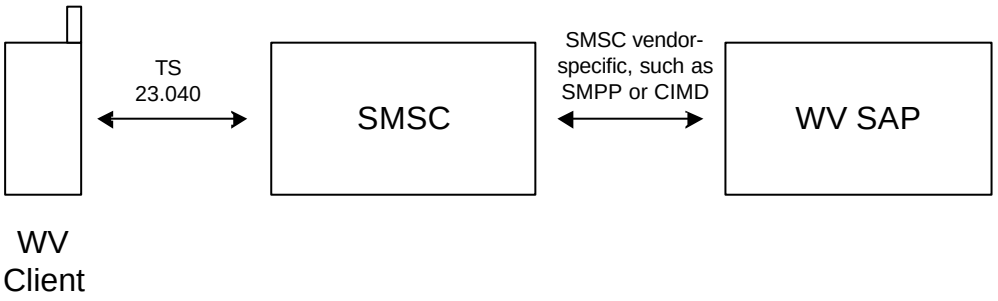

Figure 4. Architecture for SMS transport binding

The protocol between SMSC and WV SAP is one of the SMSC-vendor specific protocols, such as SMPP or CIMD.

The WV SAP is addressed by the recipient address in short message as encoded in TP-DA field in SMS-SUBMIT TPDU [TS 23.040]. The SMSC must be able to recognize this number and route it towards the WV SAP. The receiving SMSC is addressed in the RP-DA field in RP-DATA RPDU [TS 24.011].

9.2 ACCESS POINT TO WV SAP

The access point definition towards WV SAP requires normal SMSC access point definition as well as the special IN-type number identifying the WV SAP.

10. REGISTERED IDENTIFIERS

10.1 MESSAGE TYPE

The WV message types for textual and binary XML as well as for CIR content type are registered through IANA.

Proposal for registration, as well as type used for experimental purposes shall be:

application/vnd.wv.csp.xml

application/vnd.wv.csp.wbxml

application/vnd.wv.csp.cir (for PAP push submission)

10.2 WAP PUSH APPLICATION ID

The push application id is registered from the WAP Forum WINA registry.

For experimental purposes, the push application-id shall be 56731.

10.3 PORT NUMBER FOR STANDALONE UDP/IP CIR CHANNEL

The port numbers for Standalone UDP/IP CIR channel will be registered through IANA.

For experimental purposes the default port number for UDP/IP binding is 56732

10.4 PORT NUMBER FOR SMS BINDING

The port number for SMS binding will be registered through IANA

For experimental purposes the default port number is 56733.

11. STATIC CONFORMANCE REQUIREMENT FOR TRANSPORT BINDING

Req#	Description	C-Req	S-Req	Reference
TRANSP-1	Support for transport binding for data channel	M	M	
TRANSP-2	Support for transport binding for CIR channel	O	O	
TRANSP-3	Support for HTTP binding in data channel	O	O	
TRANSP-4	Support for HTTP/S binding in data channel	O	O	
TRANSP-5	Support for WSP 1.2 binding in data channel	O	O	
TRANSP-6	Support for WSP 2.0 binding in data channel	O	O	
TRANSP-7	Support for SMS binding in data channel	O	O	
TRANSP-8	Support for WAP push SMS binding in CIR channel	O	O	
TRANSP-9	Support for WAP push UDP/IP binding in CIR channel	O	O	
TRANSP-10	Support for standalone UDP/IP binding in CIR channel	O	O	
TRANSP-11	Support for standalone TCP/IP binding in CIR channel.	O	O	
TRANSP-12	With WSP 1.2 or WSP 2.0 bindings for data channel, only WAP SMS binding or WAP UDP binding is used in CIR channel.	M	M	
TRANSP-13	Sending of Poll request when poll request is received in WV message inside the WSP/HTTP(S) POST response.	M	N/A	
TRANSP-14	Sending of Poll request when CIR is received	M	N/A	