Lesson 11
Web Sockets

WebIDL and Instant Messaging

- Web Interface Definition Language (Web IDL). (http://www.w3.org/TR/WebIDL/)
- Instant messaging and many applications needs bi-direction data exchanges over same connection.
- WebSocket enables bi-directional communication over a single TCP connection

WebSocket Protocol

- An independent TCP-based protocol
- Intended to be compatible with HTTP-based server-side software and intermediaries,
- Single port can be used by both HTTP clients talking to that server and WebSocket clients talking to that server.

WebSocket Features and WSAPIs

- Small header size (2 Byte) [Over 500 Byte for HTTP request and response headers]
- WSAPIs facilitate live content and the creation of real-time games.
- Therefore, much smaller latency in message interchanges

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WebSocket: an IETF standard protocol

- RFC 6455 specifications of the web protocol. (www:/tools.ietf.org/ html/rfc6455) [December 2011]
- **WebSocket API (WSAPI**) W3C standard

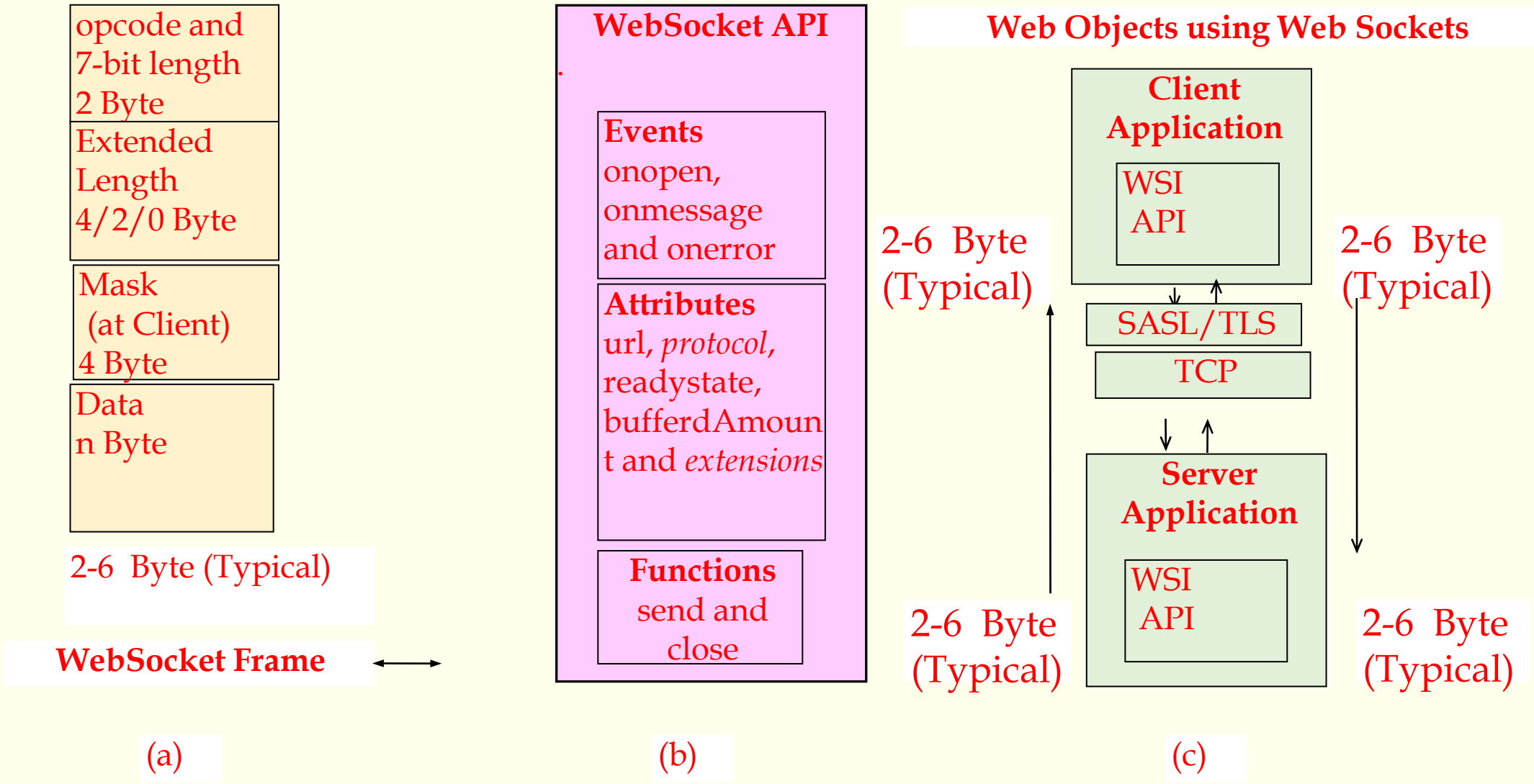

Fig. 3.9 (a) Opcode and other fields at a WebSocket Frame (b) WebSocket API events, attributes and functions (c) data Bi-directional communication using webSocket between the web objects

WebSocket Port

- Default port 80 for regular WebSocket connections using ws:// and
- port 443 when using wss:// for WebSocket connections tunneled over Transport Layer Security (TLS)
- Only relationship to HTTP is that its handshake is interpreted by HTTP servers as an Upgrade request.

WebSocket API events, attributes and functions

- Event means that condition, occurrence of which is listened by an event listener function
- As soon listener listens, an event handling function executes.
- Event handling function is also *callback* or *action*

Data bi-directional communication and Authentication

- Using WebSocket APIs between the web objects
- WebSocket APIs also at the browsers and servers
- Authentication by TLS

Events

- Onopen ( ),
- Onmessage ( ) and
- onerror ( )

Attributes

- url,
- *protocol*,
- readystate,
- bufferdAmount and
- *extensions*

Functions

- send ( ) and
- close **( )**

Six frame types in WebSocket

- Six types are (i) textual data (UTF-8) and (ii) binary data (whose interpretation is left up to the application)Ten additional reserved for future use (version 13)
- Clients and servers exchange the “messages” after success of handshake

Associated Type Frame

- Each frame belonging to the same message contains the same type of data..

Control frame

- Frame not intended to carry data for the application
- Used for protocol-level signaling, such as to signal that the connection should be closed
- Supports HTML5 WebSocket when the client and server support HTML5,

Client Library examples

- Web-socket-js (in JavaScript), Arudino C++ WebSocket client; Ruby-web-socket, .NET WebSocket client (in .NET) and Silverlight WebSocket Client

Server Library examples

- Apache-websocket,
- SuperWebSocket,
- ActiveMQ,
- PHD WebSocket and
- Socket.io (node.js)

Extensibility

- Request-response (client-server) architecture extends to iq (Information through querying),
- Chat and
- Super chat

Summary

We learnt

- WebSocket Protocol for bidirectional communication over TCP connection,
- Tiny header size (2B),
- Smaller messaging latency
- For Real time Messaging, such as in gaming

Summary

We learnt

- Use WebSocket APIs (WSAPIs)
- Used in designing the codes for Instant Messaging and many applications

End of Lesson 11 on WebSockets