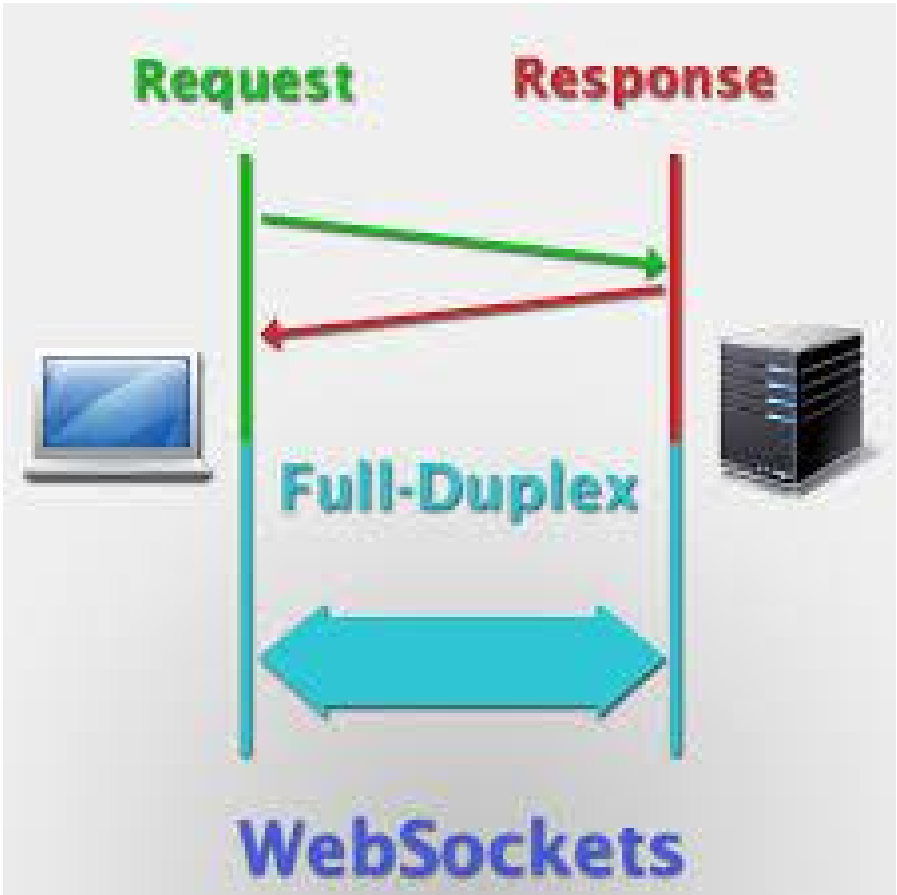
Websockets

Raheel Ahmed Khan
Cobone.com

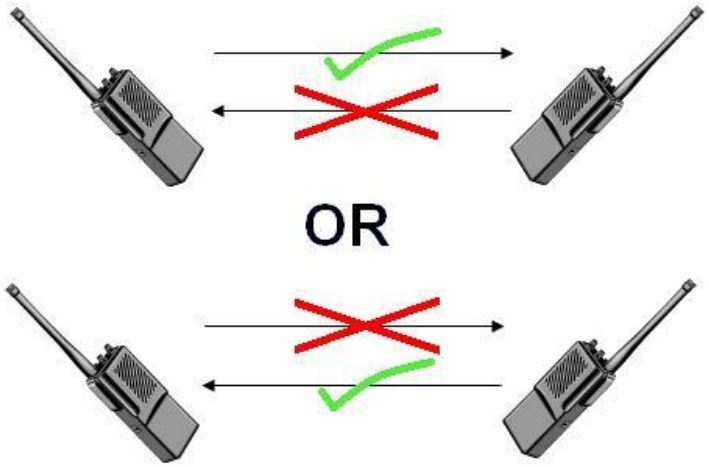
Websocket

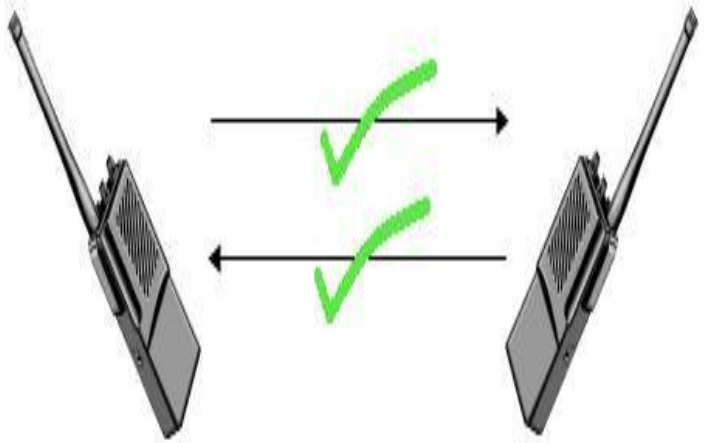
- WebSocket is a protocol which defines a full-duplex single socket connection.
- The WebSocket standard simplifies much of the complexity around bi-directional web communication and connection management.
- Websockets > Comet, Ajax



Duplex (telecommunications)

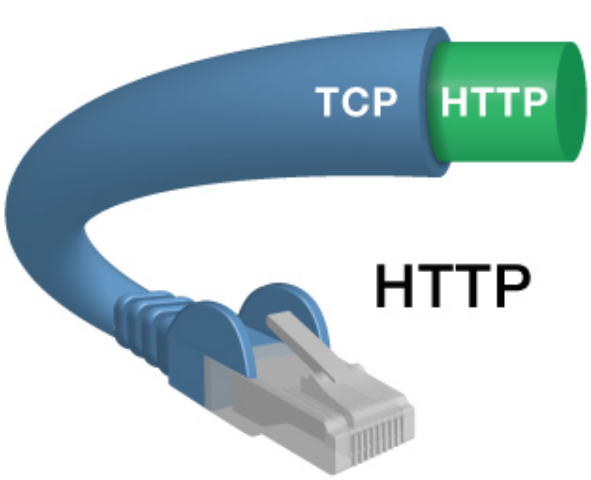
- A duplex communication system is a point-to-point system composed of two connected parties or devices that can communicate with one another in both directions. There are two types of duplex communication systems: full-duplex and half-duplex.

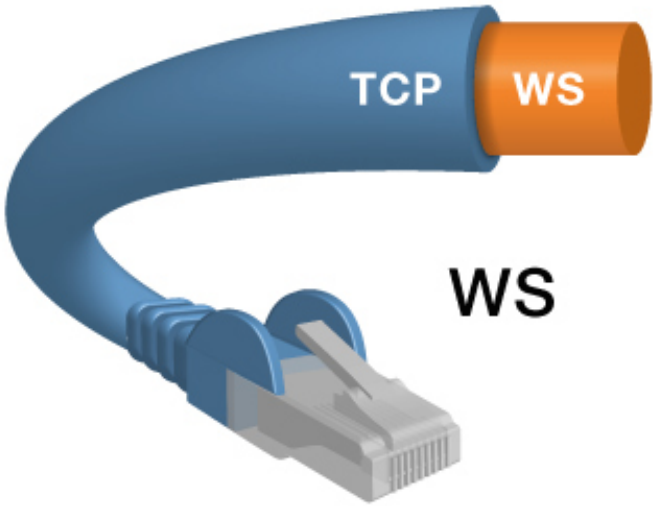




Websocket Protocol

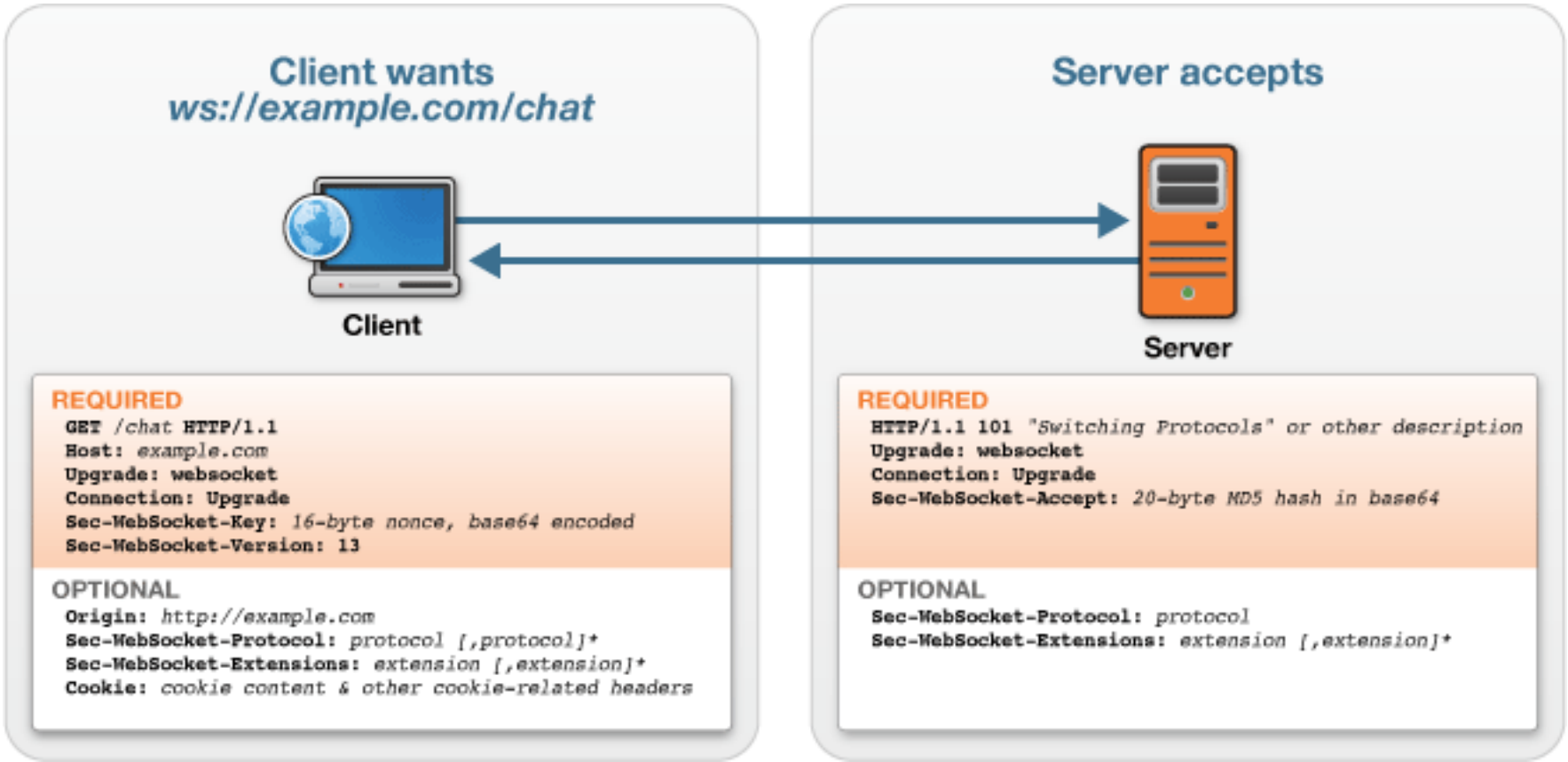
- The WebSocket Protocol is an independent TCP-based protocol. Its only relationship to HTTP is that its handshake is interpreted by HTTP servers as an Upgrade request.





WebSocket handshake

- The WebSocket protocol was designed to work well with the existing Web infrastructure. As part of this design principle, the protocol specification defines that the WebSocket connection starts its life as an HTTP connection, guaranteeing full backwards compatibility with the pre-WebSocket world. The protocol switch from HTTP to WebSocket is referred to as a the WebSocket handshake.



Browser Support

- A secure version of the WebSocket protocol is implemented in Firefox 6, Safari 6, Google Chrome 14, Opera 12.10 and Internet Explorer 10

- An older, less secure version of the protocol was implemented in Opera 11 and Safari 5, as well as the mobile version of Safari in iOS 4.2 Also, the BlackBerry Browser in OS7 implements WebSocket. Because of vulnerabilities, it was disabled in Firefox 4 and 5 and Opera 11

HTML5 WebSockets

- The HTML5 WebSockets specification defines an API that enables web pages to use the WebSockets protocol for two-way communication with a remote host.

- Syntax :

```
var myWebSocket = new WebSocket("ws://www.websockets.org");
myWebSocket.onopen = function(evt) { };
myWebSocket.onmessage = function(evt) { };
myWebSocket.onclose = function(evt) { };
myWebSocket.send("Hello WebSockets!");
myWebSocket.close();
```

REST vs WebSocket

- REST is a style of architecture so what really people mean is RESTful HTTP. As an architecture cannot be compared with a technology. But the term is so loosely used that they are used in place of each other commonly.

- WebSocket solves a few issues with REST, or HTTP in general:
  - Bi-directional
  - Full-duplex
  - Single TCP Connection
  - Lean protocol

HTTP Protocol Request Response

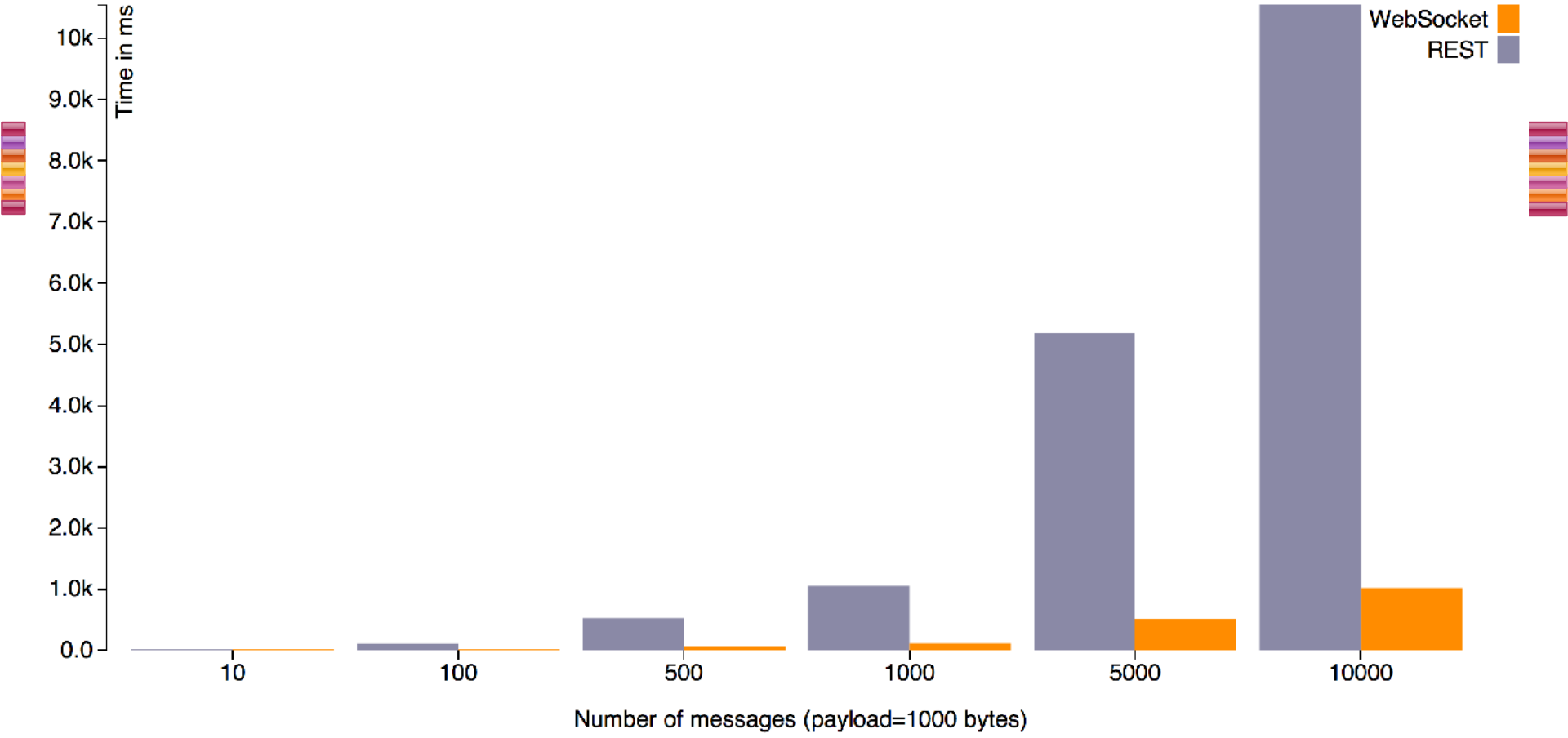
```
Host: localhost:8080\r\n
Connection: keep-alive\r\n
Content-Length: 11\r\n
User-Agent: Mozilla/5.0 (Macintosh; Intel Mac OS X 10_9_1)
AppleWebKit/537.36 (KHTML, like Gecko) Chrome/32.0.1700.107
Origin: chrome-extension://hgmloofddffdnphfgcellkdfbfbjeloo\r\n
Content-Type: text/plain \r\n
Accept: */*\r\n
Accept-Encoding: gzip,deflate,sdch\r\n
Accept-Language: en-US,en;q=0.8\r\n\r\n
```

```
HTTP/1.1 200 OK\r\n
Connection: keep-alive\r\n
X-Powered-By: Undertow 1\r\n
Server: Wildfly 8 \r\n
Content-Type: text/plain\r\n
Content-Length: 11 \r\n
Date: Fri, 21 Feb 2014 21:27:53 GMT \r\n \r\n
```

- These are 663 characters exchanged for "Hello World" echo.
- For WebSocket, after the HTTP handshake, the data is 2 bytes.

Request/Time Comparison

REST over a WebSocket echo endpoint. The payload is just a simple text array populated with 'x'.



REST overhead increases with the number of messages. This is true because that many TCP connections need to be initiated and terminated and that many HTTP headers need to be sent and received.

Websocket > RESTful HTTP ?....NO

- WebSocket is a low-level protocol, think of it as a socket on the web. Every thing, including a simple request/response design pattern, how to create/update/delete resources need, status codes etc to be build on top of it. All of these are well defined for HTTP.
- HTTP comes with a lot of other goodies such as caching, routing, multiplexing, gzipping and lot more. All of these need to be defined on top of WebSocket.
- How will Search Engine Optimization (SEO) work with WebSocket ? Works very well for HTTP URLs.
- All proxy, DNS, firewalls are not yet fully aware of WebSocket traffic. They allow port 80 but might restrict traffic by snooping on it first.