



# Bindings for OBIX: REST Bindings Version 1.0

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### Technical Committee:

OASIS Open Building Information Exchange (oBIX) TC

### Chair:

Toby Considine ([toby.considine@unc.edu](mailto:toby.considine@unc.edu)), University of North Carolina at Chapel Hill

### Editors:

Craig Gemmill ([craig.gemmill@tridium.com](mailto:craig.gemmill@tridium.com)), Tridium, Inc.  
Markus Jung ([mjung@auto.tuwien.ac.at](mailto:mjung@auto.tuwien.ac.at)), Institute of Computer Aided Automation, Vienna University of Technology

### Related work:

This specification is related to:

- *OBIX Version 1.1*. Edited by Craig Gemmill. Latest version. <http://docs.oasis-open.org/obix/obix/v1.1/obix-v1.1.html>.
- *Encodings for OBIX: Common Encodings Version 1.0*. Edited by Markus Jung. Latest version. <http://docs.oasis-open.org/obix/obix-encodings/v1.0/obix-encodings-v1.0.html>.
- *Bindings for OBIX: SOAP Bindings Version 1.0*. Edited by Markus Jung. Latest version. <http://docs.oasis-open.org/obix/obix-soap/v1.0/obix-soap-v1.0.html>.
- *Bindings for OBIX: WebSocket Bindings Version 1.0*. Edited by Matthias Hub. Latest version. <http://docs.oasis-open.org/obix/obix-websocket/v1.0/obix-websocket-v1.0.html>.

### Abstract:

This document specifies REST bindings for OBIX. OBIX provides the core information model and interaction pattern for communication with building control systems. Specific implementations of OBIX must choose how to bind OBIX interactions. This document describes the REST Binding,

an interaction pattern that can be used in conjunction with XML, EXI, CoAP, and JSON encodings, as well as other encodings that may be specified elsewhere.

**Status:**

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# 1 Introduction

This document specifies the REST bindings for OBIX.

## 1.1 Terminology

The key words “MUST”, “MUST NOT”, “REQUIRED”, “SHALL”, “SHALL NOT”, “SHOULD”, “SHOULD NOT”, “RECOMMENDED”, “MAY”, and “OPTIONAL” in this document are to be interpreted as described in **RFC2119**. When used in the non-capitalized form, these words are to be interpreted with their normal English meaning.

## 1.2 Normative References

- RFC2119** Bradner, S., “Key words for use in RFCs to Indicate Requirement Levels”, BCP 14, RFC 2119, March 1997. <http://www.ietf.org/rfc/rfc2119.txt>.
- RFC2616** Fielding, R., Gettys, J., Mogul, J., Frystyk, H., Masinter, L., Leach, P., Berners-Lee, T., “Hypertext Transfer Protocol – HTTP/1.1”, RFC2616, June 1999. <http://www.ietf.org/rfc/rfc2616.txt>.
- RFC2617** Franks, J., Hallam-Baker, P., Hostetler, J., Lawrence, S., Leach, P., Luotonen, A., Stewart, L., “HTTP Authentication: Basic and Digest Access Authentication”, RFC2617, June 1999. <http://www.ietf.org/rfc/rfc2617.txt>.
- RFC2818** Rescorla, E., “HTTP over TLS”, RFC 2818, May 2000. <http://www.ietf.org/rfc/rfc2818.txt>.
- RFC2246** Dierks, T., Allen, C., “The TLS Protocol”, RFC2246, January 1999. <http://www.ietf.org/rfc/rfc2246.txt>.
- RFC4346** Dierks, T., Rescorla, E., “The Transport Layer Security (TLS) Protocol Version 1.1”, RFC4346, April 2006. <http://www.ietf.org/rfc/rfc4346.txt>.
- RFC5246** Dierks, T. and E. Rescorla, “The Transport Layer Security (TLS) Protocol Version 1.2”, RFC 5246, August 2008. <http://www.ietf.org/rfc/rfc5246.txt>.
- OBIX Encodings** *Encodings for OBIX: Common Encodings Version 1.0*.  
See link in “Related work” section on cover page.

## 1.3 Non-Normative References

- REST** **RT Fielding** *Architectural Styles and the Design of Network-based Software Architectures*, Dissertation, University of California at Irvine, 2000, <http://www.ics.uci.edu/~fielding/pubs/dissertation/top.htm>
- CoAP** Shelby, Z., Hartke, K., Bormann, C., “The Constrained Application Protocol (CoAP)”, IETF Internet Draft, June 2014. <http://tools.ietf.org/search/rfc7252>
- CoAP-OBSERVE** Hartke, K., “Observing Resources in CoAP”, IETF Internet-Draft Version 15, October 27, 2014. <http://www.ietf.org/id/draft-ietf-core-observe-15.txt>
- OBIX 1.1** *OBIX Version 1.1*.  
See link in “Related work” section on cover page.

## 1.4 Editing Conventions

All sections of this specification SHALL be considered normative, unless specifically identified as non-normative.

---

## 40 2 HTTP Binding

### 41 2.1 Description

42 The HTTP binding specifies a simple REST mapping of OBIX requests to HTTP. A read request is a  
43 simple HTTP GET, which means that you can simply read an Object by typing its URI into your browser.  
44 Refer to “RFC2616” for the full specification of HTTP 1.1.

### 45 2.2 Requests

46 The following table summarizes how OBIX requests map to HTTP methods:

| OBIX Request | HTTP Method | Target   |
|--------------|-------------|--|
| Read         | GET         | Any Object with an href                                |
| Write        | PUT         | Any Object with an href and <code>writable=true</code> |
| Invoke       | POST        | Any op Object  |
| Delete       | DELETE      | Any Object with an href and <code>writable=true</code> |

47 *Table 2-1. Mapping of OBIX Requests to HTTP Methods.*

48 The URI used for an HTTP request MUST map to the URI of the Object being read, written, or invoked.  
49 Read requests use a simple HTTP GET and return the resulting OBIX document. Write and invoke are  
50 implemented with the PUT and POST methods respectively. The input is passed to the server as an OBIX  
51 document and the result is returned as an OBIX document.

52 If the OBIX server processes a request, then it MUST return the resulting OBIX document with an HTTP  
53 status code of 200 OK. The 200 status code MUST be used even if the request failed and the server is  
54 returning an `err` Object as the result.

### 55 2.3 Content Negotiation

56

57 The HTTP client MAY specify the MIME type of the encoding according to the **OBIX Encodings**  
58 specification for the payload of a PUT or POST request using the HTTP content type header.

59 OBIX resources MUST be encoded using MIME types defined by the corresponding encodings as defined  
60 by the **OBIX Encodings** specification. Clients and servers SHOULD follow Section 12 of **RFC2616** for  
61 content negotiation.

62 If a client wishes to GET a resource using a specific encoding, then it SHOULD specify the desired MIME  
63 type in the Accept header.

64 If the server does not support the MIME type of a client request, then it SHOULD respond with the 406  
65 Not Acceptable status code. There are two use cases for a 406 failure: 1) the client specifies an  
66 unsupported MIME type in the Accept header of a GET (read) request, or 2) the client specifies an  
67 unsupported MIME type in the Content-Type of a PUT (write) or POST (invoke) request.

### 68 2.4 Security

69 Numerous standards are designed to provide authentication and encryption services for HTTP. Existing  
70 standards SHOULD be used when applicable for OBIX HTTP implementations including:

- 71 • **RFC2617** - HTTP Authentication: Basic and Digest Access Authentication
- 72 • **RFC2818** - HTTP Over TLS (HTTPS)

73       • **RFC5246** – The TLS Protocol (Transport Layer Security). An OBIX HTTP implementation MAY  
74       support superseded versions of this standard, including **RFC2246** and **RFC4346**.

## 75   **2.5 Localization**

76   Servers SHOULD follow the localization approach outlined in the core OBIX Specification. If the desired  
77   locale of the client cannot be determined through authentication, it SHOULD be determined via the  
78   Accept-Language HTTP header. As a fallback, the locale MAY be derived from the Accept-Language  
79   header.

---

## 80 3 CoAP Binding

### 81 3.1 Description

82 The Constrained Application Protocol (CoAP) is a specialized Web transfer protocol for use within  
83 constrained nodes and constrained (e.g., low-power, lossy) networks [CoAP]. CoAP is designed for  
84 nodes operated by microcontrollers and networks such as 6LoWPAN, which often have a high packet  
85 error rate and low bandwidth (10s of kbits/s). It is intended to be used within building automation systems.

86 CoAP can be seen as optimized HTTP equivalent that uses UDP for packet exchange instead of TCP.  
87 Since UDP is a non-reliable packet oriented transport protocol CoAP provides custom facilities for reliable  
88 messaging and includes a CoAP specific acknowledgement mechanism to provide reliable point-to-point  
89 communication. Through the use of UDP it enables additional interaction patterns like asynchronous and  
90 group communication.

### 91 3.2 Requests

92 The following table summarizes how OBIX requests map to CoAP methods:

| OBIX Request | CoAP Method | Target   |
|--------------|-------------|--|
| Read         | GET         | Any Object with an href                                |
| Write        | PUT         | Any Object with an href and <code>writable=true</code> |
| Invoke       | POST        | Any op Object  |
| Delete       | DELETE      | Any Object with an href and <code>writable=true</code> |

93 *Table 3-1. Mapping of OBIX Requests to CoAP Methods.*

### 94 3.3 Content Negotiation

95 The CoAP client MAY specify the MIME type of the encoding according to the **OBIX Encodings**  
96 specification for the payload of a PUT or POST request using the CoAP header content format option to a  
97 value according to the CoAP content-format registry defined by **CoAP** which maps standard MIME types  
98 to a numeric value. Content negotiation

99 OBIX resources may be encoded using either the "text/xml" or the "application/x-obix-binary" MIME types  
100 defined by the corresponding encoding defined by the **OBIX Encodings** specification. Clients and  
101 servers SHOULD follow Section 12 of **RFC2616** for content negotiation.

102 If a client wishes to GET a resource using a specific encoding, then it SHOULD specify the desired MIME  
103 type content-format identifier in the Accept header CoAP header accept option according to the CoAP  
104 content-format registry which maps standard MIME types to a numeric value..

105 If the server does not support the MIME type of a client request, then it SHOULD respond with the 406  
106 Not Acceptable status code. There are two use cases for a 406 failure: 1) the client specifies an  
107 unsupported MIME type in the Accept header of a GET (read) request, or 2) the client specifies an  
108 unsupported MIME type in the Content-Type of a PUT (write) or POST (invoke) request.

### 109 3.4 Observing resources [non-normative]

110 An OBIX server that provides a CoAP binding SHOULD also support the CoAP Observe option on CoAP  
111 GET requests. This provides an alternative to the concept of OBIX watches, since no polling for updates  
112 on a resource is required. If the client issues a CoAP GET request with the Observe option set, an  
113 observation relationship SHOULD be established on the server. If an observed OBIX Object is updated, a  
114 CoAP response message SHOULD be sent to the client according to the **CoAP-OBSERVE** specification.



115 **3.5 Security**

116 For securing the CoAP binding the DTLS binding of CoAP as specified in **CoAP** SHOULD be used.

---

## 117 4 Conformance

### 118 4.1 Conditions for a Conforming Server Binding

119 An implementation conforms to this specification as a Server if it provides one of the bindings described  
120 in this specification, and meets all of the requirements specified in the Section describing that binding. All  
121 MUST and REQUIRED elements MUST be implemented in order to comply with the binding specification.  
122 In particular, a Server MUST be able to perform content negotiation as described in Sections 2.3 and 3.3  
123 to arrive at a common agreement for the MIME type to be used in encoding OBIX requests and  
124 responses.

### 125 4.2 Conditions for a Conforming Client Binding

126 An implementation conforms to this specification as a Client if it makes requests using one of the bindings  
127 described in this specification, and meets all of the MUST and REQUIRED level requirements described  
128 for the client request generation and response processing. In particular, a Client MUST be able to  
129 perform content negotiation as described in Sections 2.3 and 3.3 to arrive at a common agreement for the  
130 MIME type to be used in encoding OBIX requests and responses.

---

131 **Appendix A. Acknowledgments**

132 The following individuals have participated in the creation of this specification and are gratefully  
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134 **Participants:**

135 Ron Ambrosio, IBM  
136 Brad Benson, Trane  
137 Ron Bernstein, LonMark International\*  
138 Rich Blomseth, Echelon Corporation  
139 Anto Budiardjo, Clasma Events, Inc.  
140 Jochen Burkhardt, IBM  
141 JungIn Choi, Kyungwon University  
142 David Clute, Cisco Systems, Inc.\*  
143 Toby Considine, University of North Carolina at Chapel Hill  
144 William Cox, Individual  
145 Robert Dolin, Echelon Corporation  
146 Marek Dziedzic, Treasury Board of Canada, Secretariat  
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149 Wonsuk Ko, Kyungwon University  
150 Perry Krol, TIBCO Software Inc.  
151 Corey Leong, Individual  
152 Ulf Magnusson, Schneider Electric  
153 Brian Meyers, Trane  
154 Jeremy Roberts, LonMark International  
155 Thorsten Roggendorf, Echelon Corporation  
156 Anno Scholten, Individual  
157 John Sublett, Tridium, Inc.  
158 Dave Uden, Trane  
159 Ron Zimmer, Continental Automated Buildings Association (CABA)\*  
160 Rob Zivney, Hirsch Electronics Corporation  
161 Markus Jung, Institute of Computer Aided Automation, Vienna University of Technology

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163

## Appendix B. Revision History

164

| Revision | Date        | Editor        | Changes Made   |
|----------|-------------|---------------|--|
| wd01     | 26 Mar 13   | Markus Jung   | Initial creation with HTTP binding taken out of OBIX 1.1 WD07 working draft.   |
| wd02     | 27 Mar 2013 | Craig Gemmill | Add HTTP DELETE, references  |
| wd03     | 10 Apr 2013 | Craig Gemmill | Upper case SHOULD keywords   |
| wd04     | 23 May 2013 | Markus Jung   | First draft on CoAP binding, Updated MIME and content negotiation of HTTP binding to reference the encodings document. |
| wd05     | 13 Jun 2013 | Markus Jung   | Updated CoAP reference   |
| wd06     | 28 Jun 2013 | Markus Jung   | Updated reference section  |
| wd07     | 04 Dec 2013 | Craig Gemmill | Localization moved to core spec  |
| wd08     | 16 Dec 2013 | Markus Jung   | Merge with changes of Craig  |
| wd09     | 16 Dec 2013 | Markus Jung   | PR doc   |
| wd10     | 5 Nov 2014  | Craig Gemmill | Address several PR issues  |
| wd11     | 6 Nov 2014  | Craig Gemmill | Address remaining PR issues  |
| wd12     | 6 Nov 2014  | Craig Gemmill | Fix references in Section 4  |

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