

NTCIP 9010 v01.07

National Transportation Communications for ITS Protocol

XML in ITS Center-to-Center Communications

October 2003

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American Association of State Highway and Transportation Officials (AASHTO)

444 North Capitol Street, N.W., Suite 249
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Institute of Transportation Engineers (ITE)

1099 14th Street, N.W., Suite 300 West
Washington, D.C. 20005-3438

National Electrical Manufacturers Association (NEMA)

1300 North 17th Street, Suite 1847
Rosslyn, Virginia 22209-3801

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INFORMATION REPORT CONTRIBUTORS

Technical Editors:

Manny Insignares, ConSysTec
Warren Tighe, Siemens ITS

Editors and Contributors:

Mike Brown, Southwest Research
Jeff Brummond, Iteris
Blake Christie, Mitretek
Steve Dellenback, Southwest Research
David Kelley, SubCarrier Systems
Scott Lee, Illinois DOT
Jeff Mayo, TransCore ITS
Brian Pecus, CalTrans
Robert Rausch, TransCore ITS
Bruce Schopp, NEMA
Ed Seymour, Texas Transportation Institute
Ray Starr, Minnesota DOT
Jeff Thorn, New York State DOT
Warren Tighe, Siemens ITS
Walt Townsend, Siemens ITS
Ken Vaughn, Trevilon
Jeris White, Mitretek
David Zattero, Illinois DOT

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ACRONYMS

AASHTO	American Association of State Highway and Transportation Officials
ADUS	Archived Data User Systems
ASCII	American Standard Code for Information Interchange
ASN	Abstract Syntax Notation
ASP	Active Server Pages (by Microsoft)
ATIS	Advanced Traveler Information Systems
Axis	Apache's Implementation of SOAP
C2C	Center to Center
CARS	Conditional Acquisition Reporting System
CCTV	Closed Circuit Television
CDR	Common Data Representation
CGI	Common Gateway Interface
CORBA	Common Object Request Broker Architecture
DATEX	DATA Exchange
FTP	File Transfer Protocol
GRM	Generic Reference Model
HTTP	HyperText Transfer Protocol
HTTPS	Secure HyperText Transfer Protocol
ID	Identification
IDL	Interface Definition Language
IEEE	Institute of Electrical and Electronic Engineers
IIOIP	Internet Inter-ORB Protocol
IM	Incident Management
IP	Internet Protocol
ISPs	Information Service Providers
ITE	Institute of Transportation Engineers
ITS	Intelligent Transportation Systems
JSP	Java Server Pages
MSETMCC	Message Sets for External Traffic Management Center Communications
NEMA	National Equipment Manufacturers Association
NTCIP	National Transportation Communication for ITS Protocol
Oasis	Oasis Group
OER	Octet Encoding Rules
ORB	Object Request Broker
PERL	Practical Extraction and Report Language
SAE	Society of Automotive Engineers
SDOs	Standards Development Organizations
SMTP	Simple Mail Transfer Protocol
SOAP	Simple Object Access Protocol
SSL	Secure Sockets Layer
Sync	Synchronized
TCIP	Transit Communications Interface Profiles
TCP/IP	Transmission Control Protocol and the Internet Protocol
TMDD	Transportation Management Data Dictionary
TREX	Metro Denver Transportation Expansion Project
UDDI	Universal Description Discovery and Integration

ACRONYMS

UDP	User Datagram Protocol
UML	Unified Modeling Language
W3C	World Wide Web Consortium
WG	Working Group
WSDL	Web Services Description Language
XML	eXtensible Markup Language
XSL	eXtensible Stylesheet Language
XSLT	eXtensible Stylesheet Language Transform

1 INTRODUCTION

This NTCIP Information Report provides an overview of the issues involved in using XML-based technologies for Intelligent Transportation Systems (ITS) data exchange. It was developed by the NTCIP Center-to-Center Working Group (NTCIP C2C WG) to identify the opportunities and needs XML creates for the National Transportation Communications for ITS Protocol (NTCIP) effort.

This paper is written for the technical transportation system professional. An appendix includes technical information regarding XML intended for a purely technical audience. This document is not intended to be a tutorial on XML or XML-based standards, but rather provides sufficient background to support the discussion related to the development of an XML-based C2C standard consistent with the working group's mission.

This report also attempts to minimize the use of jargon, and uses deliberately abbreviated or simplified descriptions of many items and concepts in order to make the information useful for the non-technical professional. Any number of other papers, books, and web sites offer more detailed and comprehensive treatment of most of the subjects described herein.

1.1 NTCIP C2C Working Group Mission

The core mission of the NTCIP C2C WG is to: develop and maintain standards, develop application guidance for open systems, non-proprietary-based product development, and facilitate the procurement, implementation, and testing of integrated ITS center systems.

A standards-based approach can assist system applications, regardless of operating system or programming language, to communicate using simple encoded messages that both applications understand. Specifically, the goal related to development of an XML-based C2C standard is to support the communication of information and/or control commands between ITS centers.

This information report will outline two approaches for implementation of XML-based communication in center-to-center systems: first, an approach to support robust command and control leveraging the existing standards of the World Wide Web Consortium (W3C), and second, a file-based sharing approach with a focus on information sharing and aggregation. The C2C WG has coined the term “XML Direct” to refer to this file-based approach.

1.2 Current Applications Using XML for Center-to-Center Exchange

One of the driving factors in the development of this paper is the number of on-going or planned efforts that will implement XML for data exchange between transportation centers. The following are representative examples:

- Gary-Chicago-Milwaukee Corridor (planning XML traveler information to Information Service Providers (ISPs) and agencies)
- TravInfo (traveler information dissemination - San Francisco Bay area)
- CARS (rural traveler information – various western and mid-west states)
- TREX (I-25 in Denver – traveler information to ISPs and agencies over the web)

These implementations have been developed separately; using conventions customized for each project, and therefore are not guaranteed to be interoperable. There is no standard protocol or message set for exchanging data encoded in XML. XML in itself does not define dialogues,