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NTP PICS PROFORMA
For the Network Time Protocol Version 3

Status of this Memo

This memo provides information for the Internet community. This memo does not specify an Internet standard of any kind. Distribution of this memo is unlimited.

Abstract

This RFC describes a PICS Proforma translated into an Internet acceptable form. The Original document was developed according to ISO 9646 for conformance test purposes. This document is intended for both developers and users of the NTP (Network Time Protocol). This document contains specific information and performance characteristics for the use of NTP within the context of Internet usage. It is suggested, that users wishing to use the synchronization capabilities of the Internet abide by the characteristics set within this document.

For more information please contact Dr. David Mills at Mills@udel.edu or review RFC 1305 for more information.

1. INTRODUCTION

To evaluate conformance of a particular implementation, it is necessary to have a statement of the capabilities and options that have been implemented for a given protocol. Such a statement is called a Protocol Implementation Conformance Statement (PICS).

2. SCOPE

This document provides the PICS proforma for the Network Time Protocol (NTP) in compliance with the relevant requirements, and in accordance with the relevant guidance, given in ISO/IEC 9646-2.

3. REFERENCE DOCUMENTS

ISO/IEC 9646-1 1990, Information technology - Open systems interconnection - Conformance testing methodology and framework - Part 1: General concepts.

ISO/IEC 9646-2 1990, Information technology - Open systems interconnection - Conformance testing methodology and framework - Part 2: Abstract test suite specification.

RFC 1305 Network Time Protocol (Version 3) - Specification, Implementation and Analysis - David L. Mills, University of Delaware - March 1992.

4. DEFINITIONS

This document uses the following terms defined in ISO/IEC 9646-1:

a) PICS proforma;

b) Protocol Implementation Conformance Statement (PICS);

c) Static conformance review.

4.1 SPECIAL SYMBOLS

The additional symbols have been identified for use in this document:

m	Mandatory field/function
o.#	Optional field/function
c#	Conditional field/function
#	Refers to a note # below the table
x	Prohibited use
n/a	Not applicable
Y[]	Indicates the item is implemented
N[]	Indicates the item is not implemented

5. INSTRUCTIONS FOR COMPLETION OF PICS

The supplier of a protocol implementation which is claimed to conform to NTP version 3 is required to complete a copy of the PICS proforma provided in this document and is required to provide the information necessary to identify both the supplier and the implementation.

6. COPYRIGHT

7. IMPLEMENTATION IDENTIFICATION

SUPPLIER	
CONTACT POINT FOR QUERIES ABOUT THE PICS	
IMPLEMENTATION NAME AND VERSION	
OTHER INFORMATION NECESSARY FOR FULL IDENTIFICATION - e.g. NAME AND VERSION FOR MACHINES AND/OR OPERATING SYSTEMS; SYSTEM NAME	

8. NETWORK TIME PROTOCOL PICS PROFORMA

8.1 DATA FORMATS

Item No.	NTP Requirements	Reference	Status	Support
8.1.01	64 bit time stamp	3.1	m	Y[] N[]

8.2 STATE VARIABLES AND PARAMETERS

8.2.1 COMMON VARIABLES

Item No.	NTP Requirements	Reference	Status	Support
8.2.1.01	Peer Address	3.2.1	m	Y[] N[]
8.2.1.02	Peer Port	3.2.1	m	Y[] N[]
8.2.1.03	Host Address	3.2.1	m	Y[] N[]
8.2.1.04	Host Port	3.2.1	m	Y[] N[]
8.2.1.05	Leap Indicator	3.2.1	m	Y[] N[]
8.2.1.06	Mode	3.2.1	m	Y[] N[]
8.2.1.07	Stratum	3.2.1	m	Y[] N[]
8.2.1.08	Poll	3.2.1	m	Y[] N[]
8.2.1.09	Precision	3.2.1	m	Y[] N[]
8.2.1.10	Root Delay	3.2.1	m	Y[] N[]
8.2.1.11	Root Dispersion	3.2.1	m	Y[] N[]
8.2.1.12	Reference Clock Identifier	3.2.1	m	Y[] N[]
8.2.1.13	Reference Timestamp	3.2.1	m	Y[] N[]
8.2.1.14	Originate Timestamp	3.2.1	m	Y[] N[]
8.2.1.15	Receive Timestamp	3.2.1	m	Y[] N[]
8.2.1.16	Transmit Timestamp	3.2.1	m	Y[] N[]

8.2.2 SYSTEM VARIABLES

Item No.	NTP Requirements	Reference	Status	Support
8.2.2.01	Local Clock	3.2.2	m	Y[] N[]
8.2.2.02	Clock Source	3.2.2	m	Y[] N[]

8.2.3 PEER VARIABLES

Item No.	NTP Requirements	Reference	Status	Support
8.2.3.01	Configured Bit	3.2.3	m	Y[] N[]
8.2.3.02	Update Timestamp	3.2.3	m	Y[] N[]
8.2.3.03	Reachability Register	3.2.3	m	Y[] N[]
8.2.3.04	Peer Timer	3.2.3	m	Y[] N[]

8.2.4 PACKET VARIABLES

Item No.	NTP Requirements	Reference	Status	Support
8.2.4.01	Version Number	3.2.4	m	Y[] N[]

8.2.5 CLOCK FILTER VARIABLES

Item No.	NTP Requirements	Reference	Status	Support
8.2.5.01	Filter Register	3.2.5	m	Y[] N[]
8.2.5.02	Valid Data Counter	3.2.5	m	Y[] N[]
8.2.5.03	Offset	3.2.5	m	Y[] N[]
8.2.5.04	Delay	3.2.5	m	Y[] N[]
8.2.5.05	Dispersion	3.2.5	m	Y[] N[]

8.2.6 AUTHENTICATION VARIABLES

Item No.	NTP Requirements	Reference	Status	Support
8.2.6.01	Authentication Enable Bit	3.2.6	c1	Y[] N[]
8.2.6.02	Authenticated Bit	3.2.6	c1	Y[] N[]
8.2.6.03	Key Identifier	3.2.6	c1	Y[] N[]
8.2.6.04	Cryptographic Keys	3.2.6	c1	Y[] N[]
8.2.6.05	Crypto Checksum	3.2.6	c1	Y[] N[]

c1: IF authentication is used THEN m ELSE o.

8.2.7 PARAMETER VALUES

Item No.	NTP Requirements	Reference	Status	Support
8.2.7.01	Version Number = 3	3.2.7	c1	Y[] N[]
8.2.7.02	NTP Port = 123	3.2.7	c1	Y[] N[]
8.2.7.03	Max Stratum = 15	3.2.7	c1	Y[] N[]
8.2.7.04	Max Clock Age = 86,400 sec.	3.2.7	c1	Y[] N[]
8.2.7.05	Max Skew = 1 sec.	3.2.7	c1	Y[] N[]
8.2.7.06	Max Distance = 1 sec.	3.2.7	c1	Y[] N[]
8.2.7.07	Min Polling Interval = 6(64 sec.)	3.2.7	c1	Y[] N[]
8.2.7.08	Max Polling Interval = 10(1024 sec.)	3.2.7	c1	Y[] N[]
8.2.7.09	Min Select Clock = 1	3.2.7	c1	Y[] N[]

8.2.7.10	Max Select Clock = 10	3.2.7	c1	Y[] N[]
8.2.7.11	Min Dispersion = 0.01 sec.	3.2.7	c1	Y[] N[]
8.2.7.12	Max Dispersion = 16 sec.	3.2.7	c1	Y[] N[]
8.2.7.13	Reachability Reg Size = 8	3.2.7	c1	Y[] N[]
8.2.7.14	Filter Size = 8	3.2.7	c1	Y[] N[]
8.2.7.15	Filter Weight = 1/2	3.2.7	c1	Y[] N[]
8.2.7.16	Select Weight = 3/4	3.2.7	c1	Y[] N[]

c1: IF implementation is intended for use on the Internet THEN m ELSE o.

8.2.8 MODES OF OPERATION

Item No.	NTP Requirements	Reference	Status	Support
8.2.8.01	Symmetric Active	3.3	o.1	Y[] N[]
8.2.8.02	Symmetric Passive	3.3	o.1	Y[] N[]
8.2.8.03	Client	3.3	o.1	Y[] N[]
8.2.8.04	Server	3.3	o.1	Y[] N[]
8.2.8.05	Broadcast	3.3	o.1	Y[] N[]

o.1:At least one mode must be implemented.

8.2.9 EVENT PROCESSING

8.2.9.1 TRANSMIT PROCEDURE

Item No.	NTP Requirements	Reference	Status	Support
8.2.9.1.01	Transmit Procedure	3.4.2	m	Y[] N[]
8.2.9.1.02	Authentication	3.4.2	o	Y[] N[]

8.2.9.2 RECEIVE PROCEDURE

Item No.	NTP Requirements	Reference	Status	Support
8.2.9.2.01	Receive Procedure	3.4.3	m	Y[] N[]
8.2.9.2.02	Control Messages	3.4.3	o.1	Y[] N[]
8.2.9.2.03	Authentication	3.4.3	o	Y[] N[]

o.1:If implemented then section 8.6 must be completed.

8.2.9.3 PACKET PROCEDURE

Item No.	NTP Requirements	Reference	Status	Support
8.2.9.3.01	Packet Procedure	3.4.4	m	Y[] N[]
8.2.9.3.02	Authentication	3.4.4	o	Y[] N[]

8.2.9.4 CLOCK UPDATE PROCEDURE

Item No.	NTP Requirements	Reference	Status	Support
8.2.9.4.01	Clock Update	3.4.5	m	Y[] N[]

8.2.9.5 PRIMARY CLOCK PROCEDURE

Item No.	NTP Requirements	Reference	Status	Support
8.2.9.5.01	Primary Clock	3.4.6	m	Y[] N[]

8.2.9.6 INITIALIZATION PROCEDURES

Item No.	NTP Requirements	Reference	Status	Support
8.2.9.6.01	Initialization	3.4.7.1	m	Y[] N[]
8.2.9.6.02	Authentication	3.4.7.1	o	Y[] N[]

8.2.9.7 INITIALIZATION INSTANTIATION PROCEDURE

Item No.	NTP Requirements	Reference	Status	Support
8.2.9.7.01	Initialization Instantiation	3.4.7.2	m	Y[] N[]
8.2.9.7.02	Authentication	3.4.7.2	o	Y[] N[]

8.2.9.8 RECEIVE INSTANTIATION PROCEDURE

Item No.	NTP Requirements	Reference	Status	Support
8.2.9.8.01	Receive Instantiation	3.4.7.3	m	Y[] N[]
8.2.9.8.02	Authentication	3.4.7.3	o	Y[] N[]

8.2.9.9 PRIMARY CLOCK INSTANTIATION PROCEDURE

Item No.	NTP Requirements	Reference	Status	Support
8.2.9.9.01	Clock Instantiation	3.4.7.4	m	Y[] N[]

8.2.9.10 CLEAR PROCEDURE

Item No.	NTP Requirements	Reference	Status	Support
8.2.9.10.01	Clear Proc.	3.4.8	m	Y[] N[]

8.2.9.11 POLL UPDATE PROCEDURE

Item No.	NTP Requirements	Reference	Status	Support
8.2.9.11.01	Poll Update	3.4.9	m	Y[] N[]

8.2.9.12 SYNCHRONIZATION DISTANCE PROCEDURE

Item No.	NTP Requirements	Reference	Status	Support
8.2.9.12.01	Distance Proc.	3.5	m	Y[] N[]

8.3 FILTERING AND SELECTION ALGORITHMS

8.3.1 CLOCK FILTER PROCEDURE

Item No.	NTP Requirements	Reference	Status	Support
8.3.1.01	Clock Filter	4.1	o	Y[] N[]

8.3.2 CLOCK SELECTION PROCEDURE

Item No.	NTP Requirements	Reference	Status	Support
8.3.2.01	Clock Selection Procedure	4.2	o	Y[] N[]
8.3.2.02	Intersection Algorithm	4.2.1	c1	Y[] N[]
8.3.2.03	Clustering Algorithm	4.2.2	c1	Y[] N[]

c1: IF Clock Selection Procedure implemented THEN m ELSE o.

8.4 LOCAL CLOCKS

Item No.	NTP Requirements	Reference	Status	Support
8.4.01	Logical Clock	5	m	Y[] N[]

8.4.1 FUZZBALL LOCAL CLOCK IMPLEMENTATIONS

8.4.1.1 CRYSTAL OSCILLATOR BASED IMPLEMENTATION PARAMETER VALUES

Item No.	NTP Requirements	Reference	Status	Support
8.4.1.1.01	Adjustment Interval = 4 sec.	5.1	c1	Y[] N[]
8.4.1.1.02	PPS Timeout = 60 sec.	5.1	c1	Y[] N[]
8.4.1.1.02	Step Timeout = 900 sec.	5.1	c1	Y[] N[]
8.4.1.1.02	Maximum Aperture = q128 ms	5.1	c1	Y[] N[]
8.4.1.1.03	Frequency Weight = 16	5.1	c1	Y[] N[]
8.4.1.1.04	Phase Weight = 8	5.1	c1	Y[] N[]
8.4.1.1.05	Compliance Weight = 13	5.1	c1	Y[] N[]
8.4.1.1.06	Compliance Maximum = 4	5.1	c1	Y[] N[]
8.4.1.1.07	Compliance Multiplier = 4	5.1	c1	Y[] N[]

c1:IF implementing a fuzzball using a crystal oscillator based local clock THEN m ELSE o.

8.4.1.2 MAIN SYSTEM CLOCK IMPLEMENTATION PARAMETER VALUES

Item No.	NTP Requirements	Reference	Status	Support
8.4.1.2.01	Adjustment Interval = 1 sec.	5.1	c1	Y[] N[]
8.4.1.2.02	PPS Timeout = 60 sec.	5.1	c1	Y[] N[]
8.4.1.2.02	Step Timeout = 900 sec.	5.1	c1	Y[] N[]
8.4.1.2.02	Maximum Aperture = q512 ms	5.1	c1	Y[] N[]
8.4.1.2.03	Frequency Weight = 16	5.1	c1	Y[] N[]
8.4.1.2.04	Phase Weight = 9	5.1	c1	Y[] N[]
8.4.1.2.05	Compliance Weight = 13	5.1	c1	Y[] N[]
8.4.1.2.06	Compliance Maximum = 4	5.1	c1	Y[] N[]
8.4.1.2.07	Compliance Multiplier = 4	5.1	c1	Y[] N[]

c1:IF implementing a fuzzball using a main system clock THEN m ELSE o.

8.4.2 PHASE ADJUSTMENT

Item No.	NTP Requirements	Reference	Status	Support
8.4.2.01	Gradual Phase Adjustment	5.2	m	Y[] N[]
8.4.2.02	Step Phase Adjustment	5.3	m	Y[] N[]

8.5 NTP DATA FORMAT

Item No.	NTP Requirements	Reference	Status	Support
8.5.01	Leap Indicator is a 2 bit code	App. A	m	Y[] N[]
8.5.02	Version Number is a 3 bit integer	App. A	m	Y[] N[]
8.5.03	Mode is a 3 bit integer	App. A	m	Y[] N[]
8.5.04	Stratum is an 8 bit integer	App. A	m	Y[] N[]
8.5.05	Poll is an 8 bit signed integer	App. A	m	Y[] N[]
8.5.06	Precision is an 8 bit signed integer	App. A	m	Y[] N[]
8.5.07	Root Delay is a 32 bit signed fixed-point number	App. A	m	Y[] N[]
8.5.08	Root Dispersion is a 32 bit fixed-point number	App. A	m	Y[] N[]
8.5.09	Reference Identifier is a 4 octet, left justified, zero padded ASCII string	App. A	m	Y[] N[]
8.5.10	Reference Timestamp is a 64 bit timestamp format	App. A	m	Y[] N[]
8.5.11	Originate Timestamp is a 64 bit timestamp format	App. A	m	Y[] N[]
8.5.12	Receive Timestamp is a 64 bit timestamp format	App. A	m	Y[] N[]
8.5.13	Transmit Timestamp is a 64 bit timestamp format	App. A	m	Y[] N[]
8.5.14	Authenticator 96 bits	App. A	o	Y[] N[]

8.6 NTP Control Messages

8.6.1 NTP Control Message Header Format

Item No.	NTP Requirements	Reference	Status	Support
8.6.1.01	Leap Indicator is a 2 bit code	App. B.1	c1	Y[] N[]
8.6.1.02	Version Number is a 3 bit integer	App. B.1	c1	Y[] N[]
8.6.1.03	Mode is a 3 bit integer	App. B.1	c1	Y[] N[]
8.6.1.04	Response bit is a 1 Bit field	App. B.1	c1	Y[] N[]
8.6.1.05	Error bit is a 1 bit field	App. B.1	c1	Y[] N[]
8.6.1.06	More bit is a 1 bit field	App. B.1	c1	Y[] N[]

Item No.	NTP Requirements	Reference	Status	Support
8.6.1.07	Operation Code is a 5 bit integer	App. B.1	c1	Y[] N[]
8.6.1.08	Sequence is a 16 bit integer	App. B.1	c1	Y[] N[]
8.6.1.09	Status is a 16 bit code	App. B.1	c1	Y[] N[]
8.6.1.10	Association ID is a 16 bit integer	App. B.1	c1	Y[] N[]
8.6.1.11	Offset is a 16 bit integer	App. B.1	c1	Y[] N[]
8.6.1.12	Count is a 16 bit integer	App. B.1	c1	Y[] N[]
8.6.1.13	Data is a maximum of 468 octets	App. B.1	c1	Y[] N[]
8.6.1.14	Authenticator 96 bits	App. B.1	c1	Y[] N[]

c1: IF control messages are used THEN m ELSE o.

8.6.1.1 NTP Control Message Required Values

Item No.	NTP Requirements	Reference	Status	Support
8.6.1.1.01	Leap Indicator = 00	App. B.1	c1	Y[] N[]
8.6.1.1.02	Version Number = 3	App. B.1	c1	Y[] N[]
8.6.1.1.03	Mode = 6	App. B.1	c1	Y[] N[]

c1:IF control messages are used THEN m ELSE o.

8.6.2 System Words

8.6.2.1 System Status Word

Item No.	NTP Requirements	Reference	Status	Support
8.6.2.1.01	Leap Indicator is a 2 bit code	App.B.2.1	c1	Y[] N[]
8.6.2.1.02	Clock Source is a 6 bit integer	App.B.2.1	c1	Y[] N[]
8.6.2.1.03	System Event Counter is a 4 bit integer	App.B.2.1	c1	Y[] N[]
8.6.2.1.04	System Event Code is a 4 bit integer	App.B.2.1	c1	Y[] N[]

c1:IF control messages are used THEN m ELSE o.

8.6.2.2 Peer Status Word

Item No.	NTP Requirements	Reference	Status	Support
8.6.2.2.01	Peer Status is a 5 bit code	App.B.2.2	c1	Y[] N[]
8.6.2.2.02	Peer Selection is a 3 bitinteger	App.B.2.2	c1	Y[] N[]
8.6.2.2.03	Peer Event Counter is a 4 bit integer	App.B.2.2	c1	Y[] N[]
8.6.2.2.04	Peer Event Code is a 4 bit integer	App.B.2.2	c1	Y[] N[]

c1:IF control messages are used THEN m ELSE o.

8.6.2.3 Clock Status Word

Item No.	NTP Requirements	Reference	Status	Support
8.6.2.3.01	Clock Status is an 8 bit integer	App.B.2.3	c1	Y[] N[]
8.6.2.3.02	Clock Event Code is an 8 bit integer	App.B.2.3	c1	Y[] N[]

c1:IF control messages are used THEN m ELSE o.

8.6.2.4 Error Status Word

Item No.	NTP Requirements	Reference	Status	Support
8.6.2.4.01	Error Status is an 8 bit integer	App.B.2.4	c1	Y[] N[]

c1:IF control messages are used THEN m ELSE o.

9. Security Considerations

Security issues are not discussed in this memo

10. References

[1] Mills. D., "Network Time Protocol Version 3 - Specification, Implementation and Analysis", RFC 1305, UDEL, March 1992.

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