# Time Sync 1756-TIME Migration

**Application Note** 

A-TSM A-TSM/B

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## **Revision History**

Revision	Date	Comment
1.0	22 July 2022	Initial document

## **1. PREFACE**

## **1.1. PURPOSE OF THIS DOCUMENT**

This document will assist the user to migrate from the discontinued Rockwell Automation 1756-TIME module to the Aparian Time Sync Module (A-TSM/B).

## **1.2. ADDITIONAL INFORMATION**

The following documents contain additional information that can assist the user with the module installation and operation.

Resource	Link
Slate Installation	http://www.aparian.com/software/slate
Time Sync User Manual Time Sync Datasheet Example Code & UDTs	http://www.aparian.com/products/timesync
Ethernet wiring standard	www.cisco.com/c/en/us/td/docs/video/cds/cde/cde205_220_420/installa tion/guide/cde205_220_420_hig/Connectors.html
GPS information	https://www.u-blox.com/images/stories/the_gps_dictionary.pdf
1588 Precision Time Protocol (PTP)	http://www.ieee1588.com/
Network Time Protocol (NTP)	http://www.ntp.org/documentation.html
CIPSync	https://www.odva.org/Home/ODVATECHNOLOGIES/CIP/CIPTechnologyOverview/ CIPSync.aspx

Table 1.1 - Additional Information

## 1.3. SUPPORT

Technical support is provided via the Web (in the form of user manuals, FAQ, datasheets etc.) to assist with installation, operation, and diagnostics.

For additional support the user can use either of the following:

Resource	Link
Contact Us web link	www.aparian.com/contact-us
Support email	support@aparian.com

Table 1.2 – Support Details

## 2. LEGACY MODULE COMPARISON

Below is a table with the functional and environmental comparison between the legacy 1756-TIME module and the A-TSM/B.

	1756-TIME	A-TSM/B
GPS Receiver		
Channels	12	72
Constellations	GPS L1 C/A	GPS L1 C/A, SBAS, QZSS L1 C/A, GLONASS L1OF, BeiDou B1
Update Rate	1 Hz	10 Hz
Electrically Isolated	No	Yes
Antenna (LNA) Voltage	3.3 V	3.3 V
Antenna Connector	SMA (F)	SMA (F)
Antenna Provided	Bullet	Puck
Time Functions		
Time Source	Internal GPS PPS NTP IRIG-B	Internal GPS / PPS NTP
PTP Output	Yes	Yes
PTP Network Transport	IPv4 UDP	IPv4 UDP, or IEEE802.3
PTP Delay Mechanism	End-to-End	End-to-End, or Peer-to-Peer
PTP Precision (architecture dependent)	Sub 100 ns	Sub 100 ns
NTP Source	NTP Client	NTP Client NTP Symmetric
NTP Output	Yes	Yes
IRIG-B122 Source/Output	Yes	No
PLC5 / SLC500 Support	No	Yes
Modbus-TCP Master	No	Yes
Modbus-TCP Slave	No	Yes
Support GPS Holdover	No	Yes
Hardware		
Form Factor	ControlLogix Module - Single slot	Standalone - DIN Rail mount
Ethernet Port/s	Dual 10/100 Mbps (DLR capable)	10/100 Mbps
Power		
Voltage	5V (1756 backplane)	10-32 V dc
Current	1010 mA @ 5Vdc	80 mA @ 24Vdc

Environmental		
Operating Temperature	0 - 60 °C	-20 - 70 °C
Certifications		
CE	Yes	Yes
UL	Yes	Yes
Hazardous (Class 1 Div 2)	No	Yes
ODVA CIP-Sync Compliant	?	Yes
RCM	Yes	Yes
КС	Yes	No

Table 2.1 – A-TSM/B and 1756-TIME comparison

## 3. MIGRATION

The 1756-TIME module uses the Logix Add-On Profile (AOP) to configure the module while the A-TSM/B is configured using the Aparian Slate application. This program can be downloaded from <u>www.aparian.com</u> free of charge.

It is important to understand the A-TSM/B basic configuration and operation before the application migration can be done (as shown in the section below).

## 3.1. A-TSM/B CONFIGURATION AND OPERATION

## 3.1.1. A-TSM/B IP ADDRESS CHANGE

If the existing 1756-TIME module was providing 1588 PTP or NTP on Ethernet, then the A-TSM/B module will require the same IP address or an IP address in the same subnet to ensure it can be used as a drop in replacement.

The module will have DHCP (Dynamic Host Configuration Protocol) enabled as factory default. Thus, a DHCP server must be used to provide the module with the required network parameters (IP address, subnet mask, etc.). There are a number of DHCP utilities available, however it is recommended that the DHCP server in Slate be used.

Within the Slate environment, the DHCP server can be found under the Tools menu.



Figure 3.1 - Selecting DHCP Server

Once opened, the DHCP server will listen on all available network adapters for DHCP requests and display their corresponding MAC addresses.

5	DHCP Server								<u>_                                    </u>
	MAC Address	Vendor	Requests	Elapsed	Assigned IP	Assign	Status	Identity	
	00:60:35:21:AB:2C	Aparian	2	1		Assign	Discover		
	-								



**NOTE:** If the DHCP requests are not displayed in the DHCP Server it may be due to the local PC's firewall. During installation the necessary firewall rules are automatically created for the Windows firewall. Another possibility is that another DHCP Server is operational on the network and it has assigned the IP address.

To assign an IP address, click on the corresponding **Assign** button. The IP Address Assignment window will open.

E	DHCP Server									_ 🗆 🗙
	MAC Address	Vendor	Requests	Elapsed	Assigned IP	Assign	Status		Identity	
	00:60:35:21:AB:2C	Aparian	16	2		Assign	Discover			
			S Assign II IP Address	P Address	for MAC : 00:60:3	35:21:AB:2C Recent 192.168.1.2	23			
					Ok	Cancel				

Figure 3.3 - Assigning IP Address

The required IP address can then be either entered, or a recently used IP address can be selected by clicking on an item in the Recent List. If the *Enable Static* checkbox is checked, then the IP address will be set to static after the IP assignment, thereby disabling future DHCP requests.

Once the IP address window has been accepted, the DHCP server will automatically assign the IP address to the module and then read the Identity object Product name from the device. The successful assignment of the IP address by the device is indicated by the green background of the associated row.

	vendor	Requests	Elapsed	Assigned IP	Assign	Status	Identity
:60:35:21:AB:2C	Aparian	262	6	192.168.1.41	Assign	Set Static	Time Sync

Figure 3.4 - Successful IP address assignment

Once the DHCP process has been completed, the network settings can be set using the *Ethernet Port Configuration* via the *Target Browser*.

The *Target Browser* can be accessed under the *Tools* menu.



Figure 3.5 - Selecting the Target Browser

The *Target Browser* automatically scans the Ethernet network for EtherNet/IP devices.



Figure 3.6 - Target Browser

Right-clicking on a device, reveals the context menu, including the *Port Configuration* option.



Figure 3.7 - Selecting Port Configuration

All the relevant Ethernet port configuration parameters can be modified using the *Port Configuration* window.

let	work Configuration T	уре —					Speed / Duplex Configuration
0	Dynamic		Method	DHC	2	-	<ul> <li>Auto-negotiate</li> </ul>
•	Static						O Manual
Γ	Static Configuration						Manual Configuration
	IP Address	192	. 168	. 1		225	Port Speed 100 -
	Subnet Mask	255	. 255	. 255		0	Duplex Full Duplex
	Default Gateway	192	. 168	. 1		1	
	Primary NS	192	. 168	. 1		2	General
	Secondary NS	192	. 168	. 1		3	MAC Address 00:60:35:21:48:20
	Domain Name		Apari	an office			MAG Address   00.00.00.21.AD.20
	Host Name						Refresh
L							Keilesh

Figure 3.8 - Port Configuration

Alternatively, these parameters can be modified using Rockwell Automation's RSLinx software.

## 3.1.2. A-TSM/B TIME SERVICES CONFIGURATION

The Time Services configuration page in the A-TSM/B configuration will be used to configure the A-TSM/B such that it can serve as a direct replacement for the 1756-TIME module. Once the Slate software has been installed, launch the software and add a A-TSM/B module.



Figure 3.9 – Slate module add

Select the *Time Sync* module from the list and press *Ok*.

Device Name	Description	/				
MIO Scanner	1756 Honeywell PMIO Scanner					
<sup>o</sup> rocess Cache	Process Cache Module					
Process Cache Plus	Process Cache Module - Historian					
Pulse Sync	Pulse Synchronization Module					
Serial Sniffer	Serial Sniffer					
rime Sync	Time Synchronization Module					
Position	External Positioning Module	,				
	MIO Scanner Process Cache Process Cache Plus Pulse Sync Serial Sniffer Time Sync (Position	'MIO Scanner       1756 Honeywell PMIO Scanner         Process Cache       Process Cache Module         Process Cache Plus       Process Cache Module - Historian         Pulse Sync       Pulse Synchronization Module         Serial Sniffer       Serial Sniffer         Time Sync       Time Synchronization Module         Rosition       External Positioning Module				

Figure 3.10 – Time Sync Module selection

Once the module has been added, open the configuration by right-clicking on the module and selecting *Configuration*.

S Aparian-Slate - TSM Demo*
File Device Tools Window Help
🗄 🖬 🗎 🗶 🗗 👘 🕂 👘 🔝 🛠 🍫
Project Explorer
□ Ā TSM Demo
P Configur P Configuration
<ul> <li>Connection Path</li> </ul>
d Go Online
Download
1 Upload
Verify Configuration
🗗 Сору
[+ Export
X Delete

Figure 3.11 – TSM configuration selection

Once the configuration has been opened, select the *Time Services* tab (as shown below) to access the configuration that will need to match that of the 1756-TIME module.

TimeSync - Configuration		
General Time Services Advance	ed Remote Target Modbus Slave	
Time Services		
Time Source GPS / P	rp ~	✓ Enable PTP (Precision Time Protocol)
		Enable NTP Server (Network Time Protocol)
PTP (Precision Time Protocol)		
Network Transport	UDP IPv4 ~	Time to Live 64 (TTL hops)
Master Delay Mechanism	End to End	GPS Holdover Time 0 (s)
NTP Client (Network Time Prot	ocol)	
NTP Server IP Address 1	0.0.0.0	Update Interval 10 (s)
NTP Server IP Address 2	0.0.0.0	Inactive Timeout 300 (s)
	Ok Apply (	Cancel Help

Figure 3.12 – TSM Time Services selection

## 3.1.3. A-TSM/B CIPSync Parameters

The CIPSync parameters can be access in the online parameters of the A-TSM/B. The user will need to go online with the module to access these parameters. In Slate, right-click on the module and select *Go Online*.



Figure 3.13 – TSM Go Online

Once online with the module, right-click on the module and select *Status*.



Figure 3.14 – TSM Status Window

neral GPS Status Ti	me CIPSync	NTP F	Position	Relative Position	Distance	Accuracy	Satellites	Modbus	ENIP	TCP / ARP	
UTC System Time		Fric	day, 22 .	July 2022 12:48:23	3		]				
Identity	006035FFF	E200608		Announce Inte	rval	2.00	(s)	Set			
Class	6			Sync Interval		1.00	(s)	Set			
Accuracy	34			Priority 1		128		Set			
Variance	6553	5		Priority 2		128		Set			
Туре	128			Domain Numbe	er	0		Set			

In the status form select the *CIPSync* tab to access the needed parameters.

Figure 3.15 – TSM CIPSync parameters

3.1.4. A-TSM/B LOGIX CONNECTION

3.1.4.1. ADD MODULE TO I/O CONFIGURATION

When the module operates in a Logix "owned" mode the Time Sync module will need to be added to the Logix I/O tree. The module will need to be added as a generic Ethernet module. This is achieved by right clicking on the Ethernet Bridge in the Logix and selecting *New Module* after which the *ETHERNET-MODULE* is selected to be added as shown in the figure below.

**NOTE**: See the next section for importing the configuration (L5X).



Figure 3.16 - Add a Generic Ethernet Module in Logix

The user must enter the *IP address* of the Time Sync module that will be used. The assembly instance and size must also be added for the input, output, and configuration in the connection parameters section. Below are the required connection parameters.

Connection Parameter	Assembly Instance	Size
Input	105	53 (32-bit)
Output	106	3 (32-bit)
Configuration	102	0 (8-bit)

Table 3.1 - Logix class 1 co	onnection parameters	for the Time Sync module

📰 Module Prope	rties: eth (ETHERNET-MODULE 1.1	.)			×
General* Conne	ction Module Info				
Type: E Vendor: A	ETHERNET-MODULE Generic Ethernet	Module			
Parent: e	eth	- Connection Parar	neters		
Description:		Input:	Assembly Instance: 105 106	Size:	(32-bit)
Comm Format:	Data - DINT	Configuration:	102		(8-bit)
<ul> <li>IP Address</li> </ul>	s: 192 . 168 . 1 . 225	Status input:			
C Host Name	9:	Status Output:			
Status: Offline	OK	Cancel	Apply	-   - F	lelp

Figure 3.17 - Logix General module properties in Logix



**NOTE:** The user will need to enter the exact connection parameters before the module will establish a class 1 connection with the Logix controller.

Next the user needs to add the connection requested packet interval (*RPI*). This is the rate at which the input and output assemblies are exchanged. The recommended value is 200ms. Refer to the technical specification section in this document for further details on the limits of the RPI.



**NOTE**: Although the module is capable of running with an RPI of 1ms, it is recommended to set the RPI to 200ms, to avoid unnecessary loading of the module processor.

General* Connection* Module Info
Requested Packet Interval (RPI): 200.0 ms
Inhibit Module
Major Fault On Controller If Connection Fails While in Run Mode
Use Unicast Connection over EtherNet/IP

Figure 3.18 - Connection module properties in Logix

Once the module has been added to the Logix I/O tree, the user must assign the User Defined Types (UDTs) to the input and output assemblies. The user can import the required UDTs by right-clicking on *User-Defined* sub-folder in the *Data Types* folder of the I/O tree and selecting *Import Data Type*. The assemblies are then assigned to the UDTs with a ladder copy instruction (COP) as shown in the figure below.



Figure 3.19 – Logix I/O Module Tree

#### 3.1.4.2. IMPORTING UDTS AND MAPPING ROUTINES

To simplify the mapping of the input image, a Logix Routine Partial Import (L5X) file is provided.

This file can be imported by right-clicking on the required Program and selecting the *Import Routine* option.

⊡ Controller Test1     ⊡			
🖻 🤕 MainTask		New Routine	
Progra		Import Routine	
🛗 MainRc	V	Cut	Ctrlu V
🗀 Unscheduled	do .	Cut	Cui+X
🗄 🗀 Motion Groups	EB.	Сору	Ctrl+C
🗀 Add-On Instruct	ß	Paste	Ctrl+V
🗄 🗀 Data Types		Delete	Del
Trends			
🗄 🗀 I/O Configuratio		Verify	

Figure 3.20. – Logix Importing Time Sync specific routine and UDTs

🗱 Import Routir	1e			×
Look in:	👢 TimeSync	•	G 🦻 📂 🖽 <del>-</del>	
<b>2</b> -	Name 🔺		▼ Date modified	ed 🗸
	📕 TimeSyncExa	mple.L5X	2015/04/13	09:25 PM
Recent Places				
Desktop				
Libraries				
Computer				
Network				
	•			▶
	File name:	TimeSyncExample.L5X	<b>_</b>	Import
	Files of type:	RSLogix 5000 XML Files (*.L5X)	<b>~</b>	Cancel
	Files containing:	B Routine	•	Help
	Into:	🕞 MainProgram	•	

Figure 3.21 - Selecting partial import file

The import will create the following:

- The required UDTs (user defined data types)
- Two controller tags representing the Input and Output assemblies.
- A routine mapping the Time Sync module to the aforementioned tags.
- An example of how to reset the odometer.

The user may need to change the routine to map to the correct Time Sync module instance name, and make sure that the mapping routine is called by the Program's Main Routine.



Figure 3.22 - Imported Logix objects

Refer to the additional information section of this document for an example Logix project as well as the required UDTs.

## 3.2. APPLICATIONS

The required migration steps for each application are described below: The required migration steps for each application are described below:

### 3.2.1. GPS TIME SOURCE WITH PTP AND NTP OVER ETHERNET

The following application has the 1756-TIME module using *GPS* as its time source and synchronizing devices on Ethernet using 1588-PTP and NTP.



**NOTE:** In this application the 1756-TIME module does not need to be in the Logix IO tree as the time synchronization will be on Ethernet using PTP and NTP.

The following parameters in the A-TSM/B configuration will need to match that of the 1756-TIME module.

Source: Internal GPS (Receive	er) 🔹	External Source Address:	0 . 0 . 0 hour	. 0	
Time Output		Coordinate System Tir	<b>ne</b> Mastership		
Network Time Protocol - NTP		Universal Time Reference Pre V16 Logix Controller Support (-2 years)		2 years)	
Post Lock-Lost Trans	mission	Webserver V Enable Web	server		
Advanced CIP Sync Settings Priority 1: 128 (Maste	er Override)	Time To Live:	1 🔹		
Priority 2: 128 (Tie Bi	reaker)	Sync Interval (s):	1 -		
User Name: 1756-TIME			_		
user Lucation.					

3.2.1.1. TIME SOURCE

Figure 3.23 – 1756-TIME Source

The user will need to open the *Time Services* tab of the A-TSM/B in the Configuration to access the *Time Source* parameter.

TimeSync - Configuration		
General Time Services Advance	ed Remote Target Modbus Slave	
Time Services		
Time Source GPS / P	rp ~	Enable PTP (Precision Time Protocol)
		Enable NTP Server (Network Time Protocol)
PTP (Precision Time Protocol)		
Network Transport	UDP IPv4 ~	Time to Live 64 (TTL hops)
Master Delay Mechanism	End to End $\checkmark$	GPS Holdover Time 0 (s)
NTP Client (Network Time Prot	ocol)	
NTP Server IP Address 1	0 . 0 . 0 . 0	Update Interval 10 (s)
NTP Server IP Address 2	0.0.0.0	Inactive Timeout 300 (s)
	Ok Apply	Cancel Help

Figure 3.24 – A-TSM/B Time Source

Source Setting Source:	s Internal GF	PS (Receiver) 🔹	External Source Address:	0.0.0.0 hour	
Time Output	inc (PTP)		Coordinate System Tir	ne Mastership	
Netwo	rk Time Prote	ocol - NTP	Universal Time Refere	nce ix Controller Support (-2 years)	
V IRIG -	B Post Lock	-Lost Transmission	Webserver Enable Web	server	
Advanced CIP	Sync Setting	18			
Priority 1: Priority 2:	128	(Master Override) (Tie Breaker)	Time To Live: Sync Interval (s):		
Description Set User Nam	ttings e: 1756	TIME			
User Loca	ition:				

3.2.1.2. TIME OUTPUT

Figure 3.25 – 1756-TIME Time Output

The user will need to open the *Time Services* tab of the A-TSM/B in the Configuration to access the *Enable PTP* and *Enable NTP* (output) options.

FimeSync - Configuration		
General Time Services Advanc	ed Remote Target Modbus Slave	
Time Source GPS / P	TP v	Enable PTP (Precision Time Protocol)     Enable NTP Server (Network Time Protocol)
PTP (Precision Time Protocol)		
Network Transport	UDP IPv4 v	Time to Live 64 (TTL hops)
Master Delay Mechanism	End to End V	GPS Holdover Time 0 (s)
NTP Client (Network Time Prot	ocol)	
NTP Server IP Address 1	0_0_0_0_0	Update Interval 10 (s)
NTP Server IP Address 2	0.0.0.0	Inactive Timeout 300 (s)
	Ok Apply C	ancel Help

Figure 3.26 – A-TSM/B Enable PTP / NTP

Source Settings Source:				
	Internal GP9	(Receiver)	External Source Address: 0 . 0 . 0 . 0 . 0 . 0 . 0 . 0 . 0 . 0	
Time Output	c (PTP)		Coordinate System Time	
CLF Sync (FTF)     Network Time Protocol - NTP     IRIG - B     IPIG - B     Post Lock-Lost Transmission		ol - NTP	Universal Time Reference Pre V16 Logix Controller Support (-2 years)	
		ost Transmission	Webserver	
Advanced CIP S	ync Settings			
Priority 1: Priority 2:	128	(Master Uverride) (Tie Breaker)	Sync Interval (s):	
Description Settir User Name:	ngs 1756-1	TIME		
User Locatio	on:			

3.2.1.3. PTP PRIORITY

Figure 3.27 – 1756-TIME PTP Priority

The user will need to open the *CIPSync* tab in the module *Status* window when online with the A-TSM/B to access the CIPSync *Priority* parameters

TimeSync1 - Status										- (	
General GPS Status Ti	ime CIPSync NTP	Position	Relative Position	Distance	Accuracy	Satellites	Modbus	ENIP	TCP / ARP		
UTC System Time	F	riday, 22 J	July 2022 12:48:2	3		]					
Identity	006035FFFE20060	8	Announce Inte	rval	2.00	(s)	Set				
Class	6		Sync Interval		1.00	(s)	Set				
Accuracy	34		Priority 1		128		Set				
Variance	65535		Priority 2		128		Set				
Туре	128		Domain Numbe	er	0		Set				

Figure 3.28 – A-TSM/B PTP Priority

eneral Connec	ction Module	Info Configuration* Ad	Ivanced Time Sync Internet	Protocol Port Confi	iguration Network	Vendor	
Source Settings							
Source:	Internal GPS	(Receiver) 🔹	External Source Address:	0.0.0	. 0		
			NTP Update Interval:	hour	-		
Time Output			Coordinate System Ti	me			
📝 CIP Syr	nc (PTP)		Enable CST	Mastership			
Networ	rk Time Protoco	I-NTP	Universal Time Refere	ence			
	D		Pre V16 Log	-2 years)			
M Inia · c			Webserver				
	Post Lock-Lo	ost Transmission	🔽 Enable Web	server			
Advanced CIP (	Suno Sattings						
Priority 1:	128	(Master Override)	Time To Live:	1 🔻	1		
Priority 2:	128	(Tie Breaker)	Sync Interval (s):	1 -			
Description Set	ungs 1756-T	IME					
UserName							
User Local	tion:						

3.2.1.4. TIME TO LIVE

Figure 3.29 – 1756-TIME TTL

The user will need to open the *Time Services* tab of the A-TSM/B in the Configuration to access the *Time To Live* parameter.

meSync - Configuration		
neral Time Services Adv	anced Remote Target Modbus Slave	
Time Services		
Time Source GPS	/PTP V End	able PTP (Precision Time Protocol)
	🗹 Ena	able NTP Server (Network Time Protocol)
PTP (Precision Time Proto	col)	
Network Transport	UDP IPv4 ~ Time to	to Live 64 (TTL hops)
Master Delay Mechanis	m End to End v GPS H	Holdover Time 0 (s)
NTP Client (Network Time	Protocol)	
NTP Server IP Address	1 0 0 0 Update	e Interval 10 (s)
NTP Server IP Address	2 0.0.0.0 Inactive	e Timeout 300 (s)
	Ok Apply Cancel	Help

Figure 3.30 – A-TSM/B TTL

General   Connection   Modul	e Into Configuration" Ad-	vanced   Time Sync   Internet Protocol   Port Configuration   Networ	tk Vendor
Source Settings Source: Internal GPS	6 (Receiver)	External Source Address: 0.0.0.0.0.	
Time Output		Coordinate System Time Enable CST Mastership	
CIT Sync (FTP)  Network Time Protocol - NTP  IRIG - B  Post Lock-Lost Transmission		Universal Time Reference Pre V16 Logix Controller Support (-2 years)	
		Webserver     Enable Webserver	
Advanced CIP Sync Settings			
Priority 2: 128	(Master Uverride) (Tie Breaker)	Sync Interval (s):	
Description Settings User Name: 1756-	TIME		
User Location:			

3.2.1.5. SYNC INTERVAL

Figure 3.31 – 1756-TIME PTP Sync Interval

The user will need to open the *CIPSync* tab in the module *Status* window when online with the A-TSM/B to access the *Sync Interval* parameter.

TimeSync1 - Status										- 0
eneral GPS Status T	ime CIPSync NTP	Position	Relative Position	Distance	Accuracy	Satellites	Modbus	ENIP	TCP / ARF	0
UTC System Time	F	riday, 22	July 2022 12:48:23	3						
Identity	006035FFFE20060	18	Announce Inte	rval	2.00	(s)	Set			
Class	6		Sync Interval		1.00	(s)	Set			
Accuracy	34		Priority 1		128		Set			
Variance	65535		Priority 2		128		Set			
Туре	128		Domain Numbe	er	0		Set			

Figure 3.32 – A-TSM/B PTP Sync Interval

General Conn	ection Modu	e Info	Configuration*	Advanced	Time Sync	Internet Pro	otocol Port C	onfiguration	Network	Vendor	
Source Setting	gs										
Source:	Internal GP	S (Rece	iver) 🔹	Extern	al Source Add	ress: 0	. 0 . [	0.0			
				NTP U	lpdate Interval	: 1 ho	ur	Ŧ			
Time Output					Coordinate S	ystem Time					
CIP S	ync (PTP)				🗌 Ena	ble CST Ma	stership				
Netwo	ork Time Proto	col - NT	P		Universal Tim	e Reference					
	D			Pre V16 Logix Controller Support (-2 years)							
V IRIG-B		Webserver									
	Post Lock-	Lost I ra	nsmission		📝 Ena	ble Webserv	ver				
Advanced CIE	Quinc Setting										
Priority 1:	128	(Ma:	ter Override)		Time To Live:		1	•			
Prioritu 2	128	(Tie	Presker)		Sunc Interval (	e):	1	•			
T nony 2.		the	Dicakcij		oyne mervar	o).	<u></u>				
Description Se	ettings						_				
User Nan	ne: 1756	TIME									
User Loc	ation:										
-											

3.2.1.6. DESCRIPTION SETTINGS

Figure 3.33 – 1756-TIME Description Settings

The user will need to open the *General* tab of the A-TSM/B in the Configuration to access the *Name* and *Description* parameters.

5 TimeSync - Configur	ation	- • ×
General Time Service	s Advanced Remote Target Modbus Slave	
Instance Name	TimeSync	
Description	North Plant	
IP Address	192 . 168 . 1 . 235 Major Revision 1 ~	
Primary Mode	Time	
	Ok Apply Cancel Help	

Figure 3.34 – A-TSM/B Instance Name and Description

### 3.2.2. GPS TIME SOURCE WITH PTP OVER CONTROLBUS

The A-TSM/B does not communicate directly on ControlBus. If the Logix controller or Logix IO needs to be synchronized then follow the procedure in section 3.1 and use a Logix Ethernet bridge (e.g., 1756-EN2TR) to act as a boundary clock for the backplane.

### 3.2.3. NTP TIME SOURCE WITH PTP OUTPUT

The following application has the 1756-TIME module using NTP as its time source and synchronizing devices on Ethernet using 1588-PTP.



**NOTE:** In this application the 1756-TIME module does not need to be in the Logix IO tree as the time synchronization will be on Ethernet using PTP and NTP.

The following parameters in the A-TSM/B configuration will need to match that of the 1756-TIME module.

Nodule Properties: Local:1 (1756-TIME 3.001)		
General Connection Module Info Configuration* A	Advanced Time Sync Internet Protocol Port Configuration Network External Source Address: 192 , 168 , 1 , 37 NTP Update Interval:	
Time Output CIP Sync (PTP) Network Time Protocol - NTP IRIG - B Post Lock-Lost Transmission	Coordinate System Time         Enable CST Mastership         Universal Time Reference         Pre V16 Logix Controller Support. (-2. years)         Webserver         Enable Webserver	
Advanced CIP Sync Settings Priority 1: 128 (Master Override) Priority 2: 128 (Tie Breaker)	Time To Live: 1  Sync Interval (s): 1	
Description Settings User Name: 1756-TIME User Location:		
Status: Offline	OK Cancel Apply	Help

3.2.3.1. TIME SOURCE

Figure 3.35 – 1756-TIME Source

The user will need to open the *Time Services* page of the A-TSM/B in the Configuration to access the *Time Source*.

S TimeSync - Configuration		
General Time Services Advance	ed Remote Target Modbus Slave	
Time Services		
Time Source NTP Clie	ent  v Enable PTP (Precision Time Protocol)	
	Enable NTP Server (Network Time Protocol)	
PTP (Precision Time Protocol)		
Network Transport	UDP IPv4 v Time to Live 64 (TTL hops)	
Master Delay Mechanism	End to End $\lor$ GPS Holdover Time 0 (s)	
NTP Client (Network Time Prot	locol)	
NTP Server IP Address 1	192         168         1         105         Update Interval         60         (s)	
NTP Server IP Address 2	0 . 0 . 0 . 0 Inactive Timeout 300 (s)	
	Ok Apply Cancel Help	

Figure 3.36 – A-TSM/B Time Source



Module Properties: Local:1 (1756-TIME 3.001)		<u>_   ×</u>
General Connection Module Info Configuration* Advan	nced Time Sync Internet Protocol Port Configuration Network	
Source Settings Source: NTP E N	ixternal Source Address: 192 , 168 , 1 , 37 ITP Update Intervat: Sminutes	
Time Output CIP Sync (PTP) Network Time Protocol - NTP FIRIG - B Post Lock-Lost Transmission	Coordinate System Time Enable CST Mastership Universal Time Reference Pre V16 Logix Controller Support (-2 years) Webserver Enable Webserver	
Advanced CIP Sync Settings Priority 1: 128 (Master Override) Priority 2: 128 (Tie Breaker)	Time To Live:	
Description Settings User Name: 1756-TIME User Location:		
Status: Offline	OK Cancel A	pply Help

Figure 3.37 – 1756-TIME Time Output

The user will need to open the *Time Services* tab of the A-TSM/B in the Configuration to access the *Enable PTP* (output) option.

TimeSync - Configuration		- 0
General Time Services Advance	ed Remote Target Modbus Slave	
Time Services Time Source NTP Clie	nt ~	Enable PTP (Precision Time Protocol)
		Enable NTP Server (Network Time Protocol)
PTP (Precision Time Protocol)		
Network Transport	UDP IPv4 v	Time to Live 64 (TTL hops)
Master Delay Mechanism	End to End ~	GPS Holdover Time 0 (s)
NTP Client (Network Time Prot	pcol)	
NTP Server IP Address 1	192 . 168 . 1 . 105	Update Interval 60 (s)
NTP Server IP Address 2	0.0.0.0	Inactive Timeout 300 (s)
	Ok Apply Car	Help

Figure 3.38 – A-TSM/B Enable PTP

3.2.3.3. PTP PRIORITY

Module Properties: Local:1 (1756-TIME 3.001)		_ 🗆 ×
General Connection Module Info Configuration*	vdvanced   Time Sync   Internet Protocol   Port Configuration   Network	
Source Settings Source: NTP	External Source Address: 192 168 1 37 NTP Update Intervat: 5 minutes	
Time Output	Coordinate System Time Enable CST Mastership	
Vetwork Time Protocol - NTP	Universal Time Reference Pre V16 Logix Controller Support (-2 years)	
Post Lock-Lost Transmission	Webserver	
Advanced CIP Sync Settings Priority 1: 128 (Master Override)	Time To Live:	
Priority 2: 128 (Tie Breaker)	Sync Interval (s):	
Description Settings User Name: 1756-TIME		
User Location: )		
Status: Offline	OK Cancel Apply	Help

Figure 3.39 – 1756-TIME PTP Priority

The user will need to open the *CIPSync* parameter page when online with the A-TSM/B to access the CIPSync *Priority* parameter.

TimeSync1 - Status												
eneral GPS Status 1	Time	CIPSync	NTP	Position	Relative Position	Distance	Accuracy	Satellites	Modbus	ENIP	TCP / ARF	þ
UTC System Time			F	riday, 22	July 2022 12:48:2	3		]				
Identity	0	06035FFFE	20060	)8	Announce Inte	rval	2.00	(s)	Set			
Class		6			Sync Interval		1.00	(s)	Set			
Accuracy		34			Priority 1		128		Set			
Variance		6553	5		Priority 2		128		Set			
Туре		128			Domain Numb	er	0		Set			

Figure 3.40 – A-TSM/B PTP Priority

	External Source Address:   192   168   1   37 NTP Update Interval: 5 minutes	
Time Output CIP Sync (PTP) Network Time Protocol - NTP IRIG - B Post Lock-Lost Transmission	Coordinate System Time  Enable CST Mastership  Universal Time Reference  Pre V16 Logix. Controller Support (:2 years)  Webserver  Enable Webserver	
Advanced CIP Sync Settings Priority 1: 128 (Master Override) Priority 2: 128 (Tie Breaker)	Time To Live: 1 Sync Interval (s): 1	
Description Settings		

3.2.3.4. TIME TO LIVE

Figure 3.41 – 1756-TIME TTL

The user will need to open the *Time Services* tab of the A-TSM/B in the Configuration to access the *Time To Live* parameter.

TimeSync - Configuration		
General Time Services Advance	ed Remote Target Modbus Slave	
Time Services Time Source	nt v	Enable PTP (Precision Time Protocol)     Enable NTP Server (Network Time Protocol)
PTP (Precision Time Protocol)		Time to Live 64 (TTL hore)
Master Delay Mechanism	End to End v	GPS Holdover Time 0 (s)
NTP Client (Network Time Prot	pcol)	
NTP Server IP Address 1	192 <u>168</u> 1 105	Update Interval 60 (s)
NTP Server IP Address 2	0.0.0.0	Inactive Timeout 300 (s)
	Ok Apply Car	Help

Figure 3.42 – A-TSM/B TTL



Module Properties: Local:1 (1756-TIME 3.001) General Connection Module Info Configuration*	Advanced   Time Sync   Internet Protocol   Port Configuration   Network
Source Settings Source: NTP	External Source Address: 192 . 168 . 1 . 37 NTP Update Interval: 5 minutes
Time Output CIP Sync (PTP) Network Time Protocol - NTP IRIG - B Post Lock-Lost Transmission	Coordinate System Time Enable CST: Mastership Universal Time Reference Pre V16 Logix Controller Support (-2 years) Webserver Enable Webserver
Advanced CIP Sync Settings Priority 1: 128 (Master Override) Priority 2: 128 (Tie Breaker)	Time To Live: 1 Sync Interval (s): 1
User Name: 1756-TIME	
tatus: Offline	OK Cancel Apply Help

Figure 3.43 – 1756-TIME PTP Sync Interval

The user will need to open the *CIPSync* tab in the Status window when online with the A-TSM/B to set the *Sync Interval* parameter.

TimeSync1 - Status										- 0
General GPS Status T	me CIPSync NTP	Position	Relative Position	Distance	Accuracy	Satellites	Modbus	ENIP	TCP / ARF	D
UTC System Time	F	riday, 22 v	July 2022 12:48:23	3						
Identity	006035FFFE20060	8	Announce Inter	rval	2.00	(s)	Set			
Class	6		Sync Interval		1.00	(s)	Set			
Accuracy	34		Priority 1		128		Set			
Variance	65535		Priority 2		128		Set			
Туре	128		Domain Numbe	Domain Number 0			Set			

Figure 3.44 – A-TSM/B PTP Sync Interval

Source Settings Source: NTP	External Source Address: 192 . 168 . 1 . 37 NTP Update Interval: 5 minutes	
Time Output  CIP Sync (PTP)  Network Time Protocol - NTP  IRIG - B  Post Lock-Lost Transmission	Coordinate System Time Enable CST Mastership Universal Time Reference Pre V16 Logix Controller Support (-2 years) Webserver Enable Webserver	
Advanced CIP Sync Settings Priority 1: 128 (Master Override) Priority 2: 128 (Tie Breaker)	Time To Live: 1 💌 Sync Interval (s): 1 💌	
Description Settings User Name: 1756-TIME User Location:		

Figure 3.45 – 1756-TIME Description Settings

The user will need to open the *General* page of the A-TSM/B in the Configuration to access the *Name and Description* parameters.

🗧 TimeSync - Configur	ration	- • ×
General Time Service	as Advanced Remote Target Modbus Slave	
Instance Name	TimeSync	
Description	North Plant	
IP Address	192 . 168 . 1 . 235 Major Revision 1 v	
Primary Mode	Time	
	Ok Apply Cancel Help	

Figure 3.46 – A-TSM/B Instance Name and Description

3.2.4. LOGIX WALLCLOCK SYNC USING I/O ASSEMBLY

When using the time provided in the input assembly of the 1756-TIME module in Logix, the user will need to remap the Logix application code to use the new A-TSM/B assembly. The A-TSM/B will need to be added to an Ethernet bridge (e.g., 1756-EN2TR) tree in Logix as shown below. See the Logix Connection section for details regarding the Logix Class 1 connection parameters.



Figure 3.47 – A-TSM/B Instance Name and Description

The user can import the provided UDTs and mapping routines to map the input and output assemblies to User Defined Types (UDTs). See the Importing UDTs section for more information.

The following tags will need to be remapped in Logix.

3.2.4.1. MODULE FLAGS

Name	Value 🔸	Force Mask *	Style	Data Type
E-Local:5:1	{}	{}		HT:1756_TIME_rev3:1:0
	0		Decimal	DINT
	1		Decimal	DINT
Local:5:I.ModuleStatus	0		Decimal	DINT
-Local:5:I.WebserverEnabled	0		Decimal	BOOL
E-Local:5:I.Time	{}	{}		HT:1756_CLOCK rev3:1:0
E-Local:5:I.Time.Status	2#0000_000		Binary	DINT
-Local:5:I.Time.TimeValid	1		Decimal	BOOL
-Local:5:I.Time.CIPSyncOutputEnabled	1		Decimal	BOOL
-Local:5:I.Time.NTPOutputEnabled	0		Decimal	BOOL
-Local:5:I.Time.IRIGBOutputEnabled	1		Decimal	BOOL
-Local:5:I.Time.CSTMasterEnabled	0		Decimal	BOOL
-Local:5:I.Time.CSTMastership	0		Decimal	BOOL

Figure 3.48 – 1756-TIME Logix Assembly – Module Flags

=-TS	M01Input	{}	<b>{</b>		AparianTim	eSyncInput	
÷	[SM01Input.Instance		<b>{</b>		STRING		
<u> </u>	[SM01Input.Status	{}			AparianTimeSyncStatusR		
	TSM01Input.Status.ConfigurationValid	0		Decimal	BOOL		
	TSM01Input.Status.PTPEnabled	0		Decimal	BOOL		
	TSM01Input.Status.NTPEnabled	0		Decimal	BOOL		
	-TSM01Input.Status.AntennaShort	0		Decimal	BOOL		
	- TSM01Input.Status.Fix2D	0		Decimal	BOOL		

Figure 3.49 – A-TSM/B Logix Assembly – Module Flags

## 3.2.4.2. GPS FLAGS AND STATUS

- Local:5:I.GPS	{}	{}		HT:1756_CL	OCK rev3:1:0
Local:5:I.GPS.GPSStatus	2#0000 000		Binary	INT	
-Local:5:I.GPS.GPSLock	1		Decimal	BOOL	
-Local:5:I.GPS.AntennaOK	1		Decimal	BOOL	
-Local:5:I.GPS.HDOPOk	1		Decimal	BOOL	
-Local:5:I.GPS.PPS	0		Decimal	BOOL	
Local:5:I.GPS.FaultCode	0		Decimal	INT	
Local:5:I.GPS.Mode	0		Decimal	INT	
+ Local:5:I.GPS.SVCount	8		Decimal	INT	
-Local:5:I.GPS.Latitude	-26.088095		Float	REAL	
-Local:5:I.GPS.Longitude	28.005533		Float	REAL	
-Local-5:LGPS Altitude	1569.2		Float	REAL	

Figure 3.50 – 1756-TIME Logix Assembly – GPS Flags and Status

- TSM01Input	{}	<b>{</b>		AparianTin	neSyncInput
TSM01Input.Instance		<b>{</b>		STRING	
<ul> <li>TSM01Input.Status</li> </ul>	{}	{		AparianTin	neSyncStatusR.
-TSM01Input.Status.ConfigurationValid	0		Decimal	BOOL	
-TSM01Input.Status.PTPEnabled	0		Decimal	BOOL	
-TSM01Input.Status.NTPEnabled	0		Decimal	BOOL	
-TSM01Input.Status.AntennaShort	0		Decimal	BOOL	
-TSM01Input.Status.Fix2D	0		Decimal	BOOL	
-TSM01Input.Status.Fix3D	0		Decimal	BOOL	
-TSM01Input.Status.FixAutonomous	0		Decimal	BOOL	
-TSM01Input.Status.FixDifferential	0		Decimal	BOOL	
-TSM01Input.Status.NTPSource1Connected	0		Decimal	BOOL	
TSM01Input.Status.NTPSource2Connected	0		Decimal	BOOL	
-TSM01Input.InterferenceIndication	0.0		Float	REAL	
	0		Decimal	SINT	
TOMONI I DI T				A 1 71	C DIT

#### Figure 3.51 – A-TSM/B Logix Assembly – GPS Flags and Status

#### 3.2.4.3. TIME

E-Local:5:I.Time	{}	{}		HT:1756_C	LOCK rev3:I:
+ Local:5:I.Time.Status	2#0000_000		Binary	DINT	
-Local:5:I.Time.TimeValid	1		Decimal	BOOL	
-Local:5:I.Time.CIPSyncOutputEnabled	1		Decimal	BOOL	
-Local:5:I.Time.NTPOutputEnabled	0		Decimal	BOOL	
-Local:5:I.Time.IRIGBOutputEnabled	1		Decimal	BOOL	
-Local:5:I.Time.CSTMasterEnabled	0		Decimal	BOOL	
-Local:5:1.Time.CSTMastership	0		Decimal	BOOL	
-Local:5:I.Time.CSTDuplicateDetect	0		Decimal	BOOL	
Local:5:1.Time.SimulationModeActive	0		Decimal	BOOL	
Eccal:5:I.Time.Year	2014		Decimal	DINT	
Eccal:5:I.Time.Month	5		Decimal	DINT	
Eccal:5:I.Time.Day	6		Decimal	DINT	
Eccal:5:1.Time.Hour	8		Decimal	DINT	
+ Local:5:I.Time.Minute	41		Decimal	DINT	
+ Local:5:I.Time.Second	10		Decimal	DINT	
Eccal:5:1. Time. Micro Second	778800		Decimal	DINT	
E-Lecal:5:I.UTC	{}	{}	Decimal	DINT[2]	

#### Figure 3.52 – 1756-TIME Logix Assembly – Time

- T	SM01Input.DateTime	{}	{		AparianTimeSync	DateTime
-	TSM01Input.DateTime.UTC	DT#1970-01-01-02:00:00.000000 (GMT+02:00)		Date/Time	LINT	
÷.	TSM01Input.DateTime.Year	0		Decimal	INT	
÷.	TSM01Input.DateTime.Month	0		Decimal	SINT	
÷.	TSM01Input.DateTime.Day	0		Decimal	SINT	
Ē	TSM01Input.DateTime.Hour	0		Decimal	SINT	
Ē	TSM01Input.DateTime.Minute	0		Decimal	SINT	
Ē	TSM01Input.DateTime.Second	0		Decimal	SINT	
÷.	TSM01Input.DateTime.Nanosecond	0		Decimal	DINT	

Figure 3.53 – A-TSM/B Logix Assembly – Time

### 3.2.5. LOGIX POSITIONING

When using the time provided in the input assembly of the 1756-TIME module in Logix, the user will need to remap the Logix application code to use the new A-TSM/B assembly. The A-TSM/B will need to be added to an Ethernet bridge (e.g., 1756-EN2TR) tree in Logix as shown below. See the Logix Connection section for details regarding the Logix Class 1 connection parameters.



Figure 3.54 – A-TSM/B Instance Name and Description

The user can import the provided UDTs and mapping routines to map the input and output assemblies to User Defined Types (UDTs). See the Importing UDTs section for more information.



**NOTE:** When using relative and positioning, the 1756-TIME module uses PositionX, Y, and Z while the A-TSM/B uses relative Latitude, Longitude, and Altitude as well as relative North and East.

The following tags will need to be remapped in Logix.

### 3.2.5.1. GPS FLAGS AND STATUS

- Local:5:I.GPS	{}	{}		HT:1756_CL	.OCK rev3:1:0
+ Local:5:I.GPS.GPSStatus	2#0000 000		Binary	INT	
-Local:5:I.GPS.GPSLock	1		Decimal	BOOL	
Local:5:I.GPS.AntennaOK	1		Decimal	BOOL	
-Local:5:I.GPS.HDOPOk	1		Decimal	BOOL	
-Local:5:I.GPS.PPS	0		Decimal	BOOL	
Local:5:I.GPS.FaultCode	0		Decimal	INT	
Local:5:I.GPS.Mode	0		Decimal	INT	
+ Local:5:I.GPS.SVCount	8		Decimal	INT	
-Local:5:I.GPS.Latitude	-26.088095		Float	REAL	
-Local:5:I.GPS.Longitude	28.005533		Float	REAL	
- Local 5: LGPS Altitude	1569.2		Float	REAL	

Figure 3.55 – 1756-TIME Logix Assembly – GPS Flags and Status

E-TSM01Input	{}	<b>{</b>		AparianTin	neSyncInput
		<b>{</b>		STRING	
- TSM01Input.Status	{}	<b>{</b>		AparianTin	neSyncStatusR.
-TSM01Input.Status.ConfigurationValid	0		Decimal	BOOL	
-TSM01Input.Status.PTPEnabled	0		Decimal	BOOL	
-TSM01Input.Status.NTPEnabled	0		Decimal	BOOL	
-TSM01Input.Status.AntennaShort	0		Decimal	BOOL	
-TSM01Input.Status.Fix2D	0		Decimal	BOOL	
-TSM01Input.Status.Fix3D	0		Decimal	BOOL	
-TSM01Input.Status.FixAutonomous	0		Decimal	BOOL	
-TSM01Input.Status.FixDifferential	0		Decimal	BOOL	
-TSM01Input.Status.NTPSource1Connected	0		Decimal	BOOL	
TSM01Input.Status.NTPSource2Connected	0		Decimal	BOOL	
-TSM01Input.InterferenceIndication	0.0		Float	REAL	
<b>TSM01Input.SatelliteCount</b>	0		Decimal	SINT	
Total and the second					

Figure 3.56 – A-TSM/B Logix Assembly – GPS Flags and Status

### 3.2.5.2. POSITION AND SPEED

E-Local:5:I.GPS	{}	{}		HT:1756_CLO	CK rev3:I:0
E-Local:5:I.GPS.GPSStatus	2#0000_000		Binary	INT	
-Local:5:I.GPS.GPSLock	1		Decimal	BOOL	
-Local:5:I.GPS.AntennaOK	1		Decimal	BOOL	
-Local:5:I.GPS.HDOPOk	1		Decimal	BOOL	
-Local:5:I.GPS.PPS	0		Decimal	BOOL	
Local:5:I.GPS.FaultCode	0		Decimal	INT	
E-Local:5:I.GPS.Mode	0		Decimal	INT	
E-Local:5:I.GPS.SVCount	8		Decimal	INT	
-Local:5:I.GPS.Latitude	-26.088095		Float	REAL	
-Local:5:I.GPS.Longitude	28.005533		Float	REAL	
-Local:5:I.GPS.Altitude	1569.2		Float	REAL	
-Local:5:I.GPS.GroundSpeed	0.0		Float	REAL	
-Local:5:I.GPS.DegreeFromTrueNorth	0.0		Float	REAL	
-Local:5:I.GPS.MagneticVariationFromTrueNorth	0.0		Float	REAL	
-Local:5:I.GPS.RelativePositionX	0.0		Float	REAL	
-Local:5:I.GPS.RelativePositionY	0.0		Float	REAL	
Local:5:I.GPS.RelativePositionZ	0.0		Float	REAL	

Figure 3.57 – 1756-TIME Logix Assembly – Position and Speed

Ξ	- TSM01Input	{}	{		AparianTimeSyncInput
	TSM01Input.Instance		<b>{</b>		STRING
	TSM01Input.Status	{}	<b>{</b>		AparianTimeSyncStatusR
	-TSM01Input.InterferenceIndication	0.0		Float	REAL
	TSM01Input.SatelliteCount	0		Decimal	SINT
		{}	{		AparianTimeSyncDateTime
	TSM01Input.Velocity	{}	{		AparianTimeSyncVelocity
	-TSM01Input.Velocity.TrueCourseOverGround	0.0		Float	REAL
	-TSM01Input.Velocity.SpeedOverGroundKnots	0.0		Float	REAL
	TSM01Input.Velocity.SpeedOverGroundKmh	0.0		Float	REAL
	TSM01Input.Position	{}	{		AparianTimeSyncPosition
	-TSM01Input.Position.Latitude	0.0		Float	REAL
	TSM01Input.Position.Longtitude	0.0		Float	REAL
	-TSM01Input.Position.Altitude	0.0		Float	REAL
	-TSM01Input.Position.ReferenceLatitude	0.0		Float	REAL
_					

Figure 3.58 – A-TSM/B Logix Assembly – Position and	Speed
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## 3.2.6. GPS TIME SOURCE WITH IRIG-B OUTPUT

The A-TSM/B does not support legacy IRIG-B.

3.2.7. GPS TIME SOURCE WITH CST OVER CONTROLBUS

The A-TSM/B does not support legacy CST.