# Adroit Tag Synchronization Service

Introduction

The Adroit Tag Synchronization Service (TSS) is a component of the Adroit Smart SCADA software suite that is responsible for synchronizing, in a strictly unidirectional sense, any number of secondary servers *outside* a secure zone, from a server *inside* a secure zone. This is achieved by making use of *Data Diode* hardware such as the OPDS-MP Owl Perimeter Defense Solution from Owl Computing Technologies.
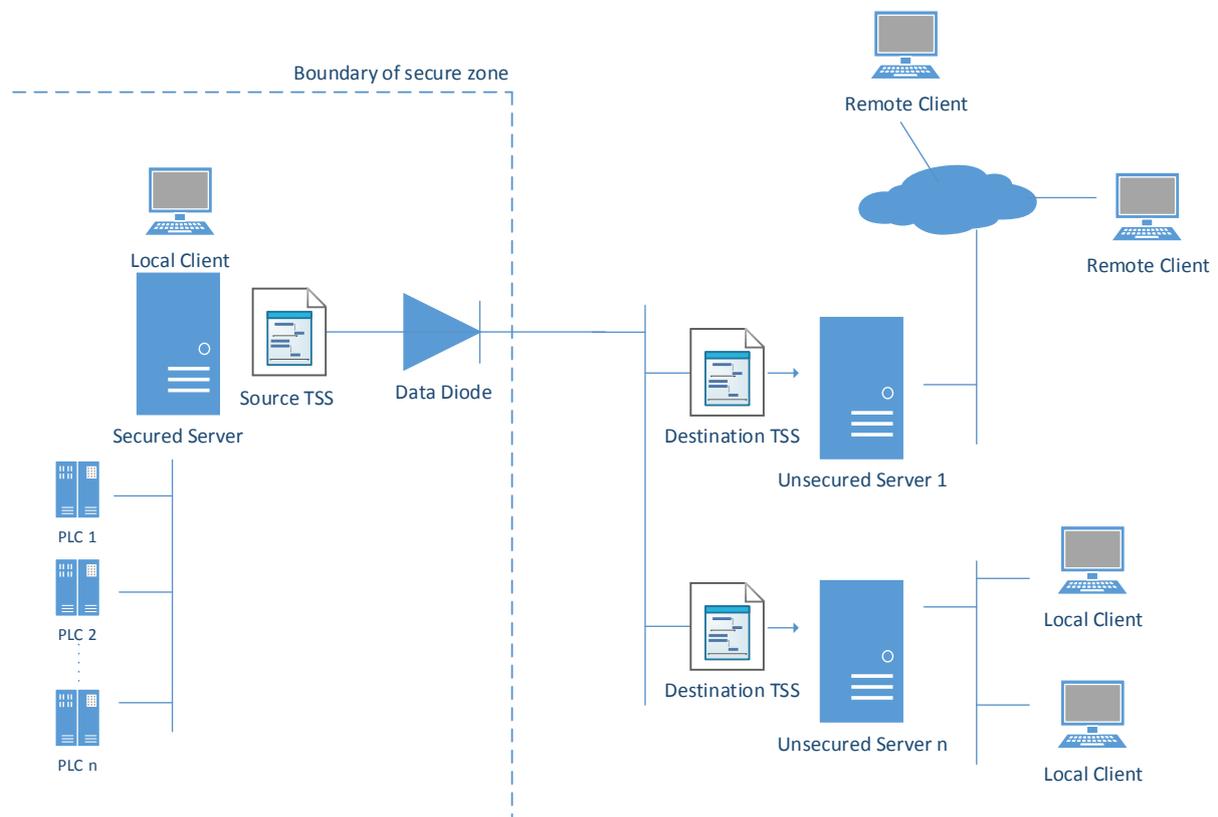

Adroit Perimeter Defence Solution

On the diagram above, the secure zone is shown on the left behind the dotted line which represents a designated secure perimeter. Local I/O, shown on the diagram as PLC 1, PLC 2, through PLC n, are connected to the Adroit server within the secure zone, which in turn exclusively connects to the outside world via a data diode. The data diode physically separates its incoming network interface from its outgoing network interface in such a way that network data flow is possible only in unidirectional sense: secure zone -> unsecured zone, and in so doing renders the equipment behind the perimeter defence totally secure from outside cyber-attack, and other escalating external threats. At the same time, thanks to Adroit's Tag Synchronization Service, any number of servers outside the secure zone can be kept *in-sync* with the server inside the secure zone, whilst offering client connectivity to local and/or remote client workstation HMIs and other applications.

The reason something as comprehensive as a specialized Tag Synchronization Service is required is because most application network protocols, including all the hitherto available Adroit network APIs, require some kind of *Request-Response* bi-directional chit-chat at the application level. The data diode obviously prevents this from happening successfully, and so a new, purely unidirectional application protocol, TSS, has been created.

TSS is implemented as an Operating System service so that, just like the Adroit agent server, and Smart UI graphics server, it can be configured to start up automatically, without any user intervention, when the server machine is booted.

Setup and Installation

On the Adroit distribution media is a TSS sub-folder and in this folder are the installer files to install the Adroit Tag Synchronization Service. Just double-click the setup.exe executable while logged on with admin privilege in order to install the service.
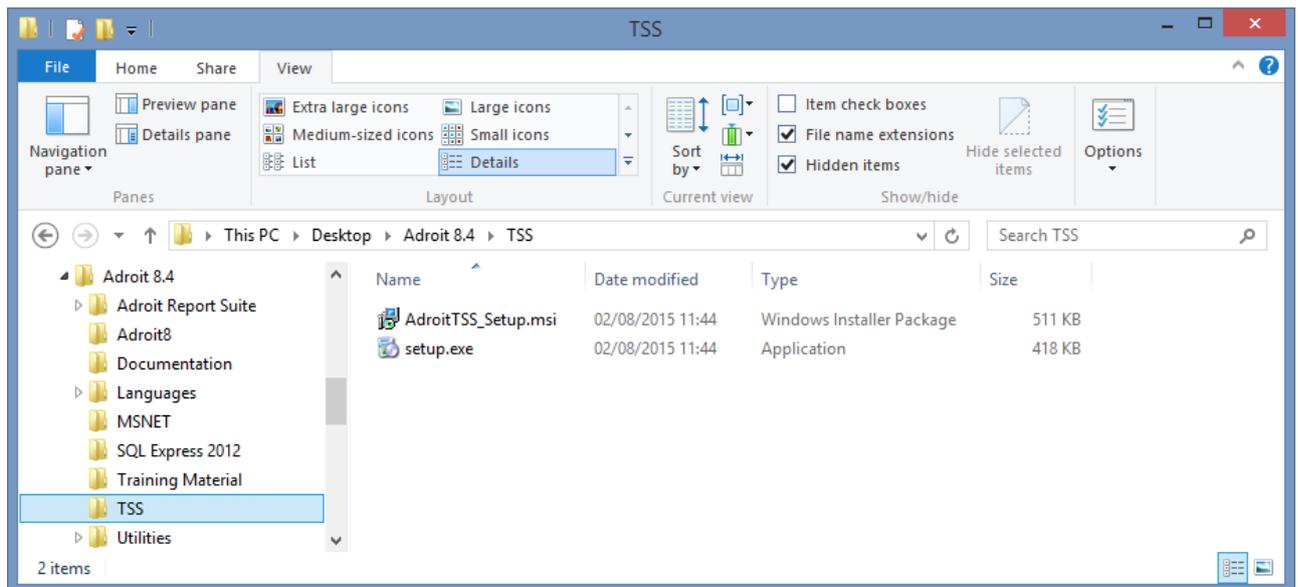
Once installed, the service should appear in the Windows *Services.msc* snap-in, as shown in the screenshot. From here it can be started or stopped, configured to run automatically or manually, assigned Log On credentials, etc. – just like any other operating system service.
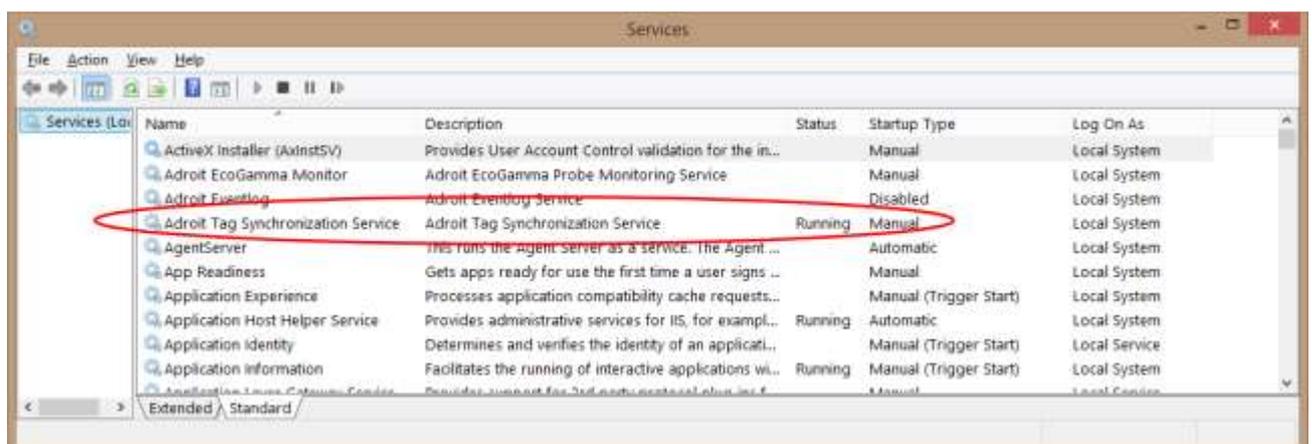
The Adroit source TSS connects to its destination TSS's on TCP port 2055. For this reason it is important to configure the Windows firewall on all *destination* servers to allow inbound connections on this port, as shown in the screenshot below…
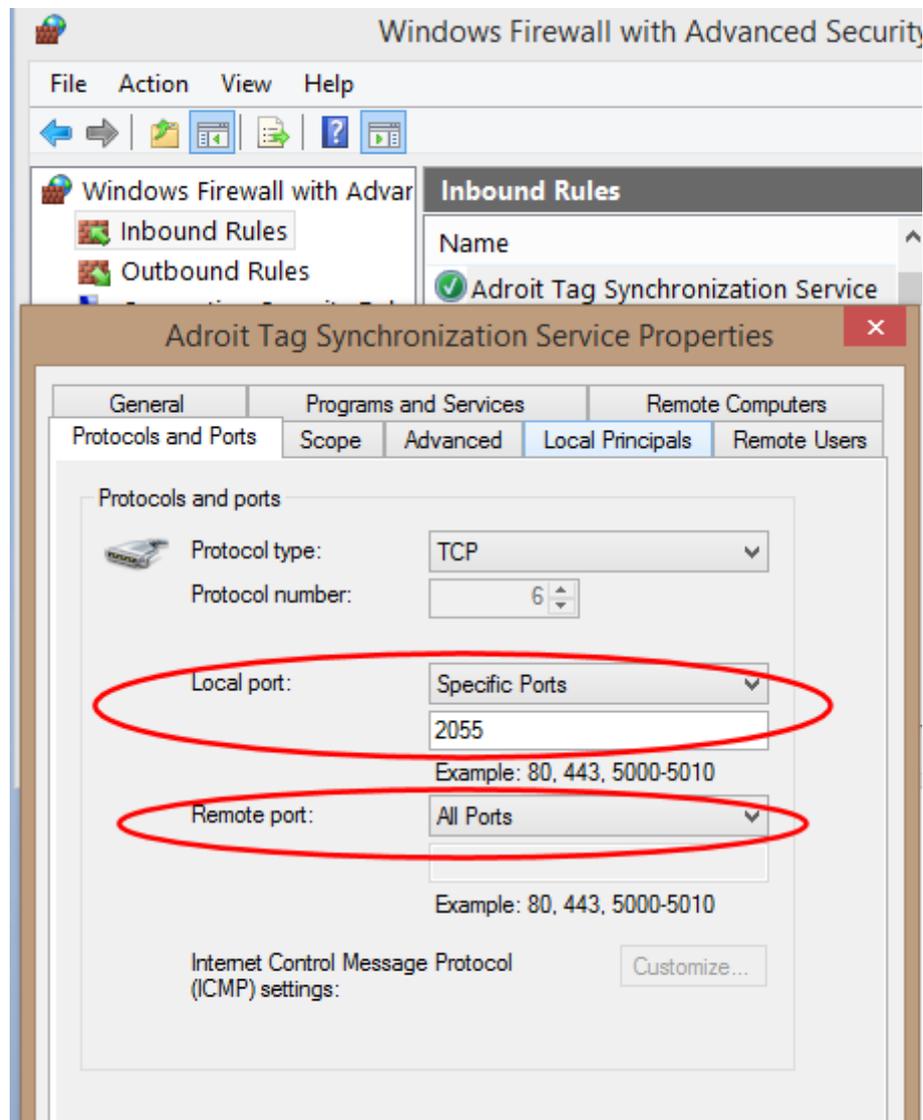
Configuration

Configuration of the service is done by means of an XML file – Tags.XML installed to the C:\ProgramData\Adroit Technologies folder as shown below:

```xml
<?xml version="1.0" encoding="utf-8" ?>
  <Configuration>
    <Mode>Source</Mode>
    <Destinations>
      <Server name="VBUILD">
        <IPAddress name="NIC1">192.168.1.32</IPAddress>
        <RefreshEvery>5</RefreshEvery>
        <FullSyncEvery>60</FullSyncEvery>
        <SyncFromStandby>false</SyncFromStandby>
          <Tags>
            <Tag>A1.value</Tag>
            <Tag>A2.value</Tag>
            <Tag>A3.value</Tag>

            <Tag>A999.value</Tag>
          </Tags>
      </Server>
      <Server>
        <IPAddress>...</IPAddress>


      </Server>


    </Destinations>
  </Configuration>
```

Significant XML tags and values in this file are as follows:

Mode	Defines whether TSS is to run as *Source* or *Destination* service. On the secure server, behind the data diode you should configure the service to be the *Source*. If the Tags.xml file does not exist in its designated folder, or the value of the mode Tag is anything other than "Source", TSS will run as a *Destination* service
Server	For each secondary server, outside the secure zone, that is to be synchronized, a <Server> tag must exist. The name attribute of this tag is not important and is there just for clarity/readability of the XML
IPAddress	IPV4 address of the destination server. Once again, the name attribute shown for this tag in the example above is of no real significance

RefreshEvery	Interval in seconds at which the destination server will be refreshed. The source TSS service *subscribes* to all Adroit tags configured in the Tags.xml file. This means TSS is notified every time a tag value or status changes. The changed tag values <u>and</u> agent status words accumulated since the last refresh are sent to the destination server on expiry of the next refresh interval
FullSyncEvery	Because TSS is purely unidirectional and no application-level acknowledgment is possible, it is important that the destination server is periodically updated with all tag data and agent status words, irrespective of whether there have been any changes or not. The <FullSyncEvery> interval should clearly be longer than the <RefreshEvery> interval. Typical values for these may be 60 seconds and 1 second respectively
SyncFromStandby	This tag is used to determine whether you want the Standby partner in a dual-redundant source configuration to sync the destination server. A value of 'false' for this tag will prevent a standby source server from synchronizing the destination server and a value of 'true' will do the opposite
Tag	For every Adroit tag to be synced in the destination server, a <Tag> entry must exist in the Tags.xml file. The Adroit tags themselves should exist in both the source and destination servers, but there is no requirement that every destination server should have every tag. This means that it is possible to sync different sub-sets of source server tags into different destination servers

Diagnostics

Operation of TSS is largely transparent to the user. However, for diagnostic purposes, certain information is logged to the Windows event log.

First, some typical Windows Event Log messages on a source TSS server...
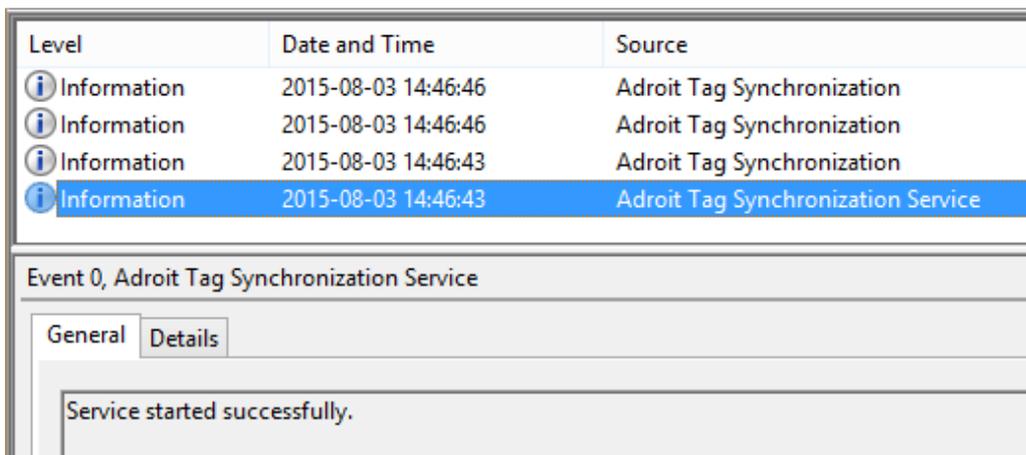
Level	Date and Time	Source
(i) Information	2015-08-03 14:46:46	Adroit Tag Synchronization
(i) Information	2015-08-03 14:46:46	Adroit Tag Synchronization
(i) Information	2015-08-03 14:46:43	Adroit Tag Synchronization
(i) Information	2015-08-03 14:46:43	Adroit Tag Synchronization Service

Event 0, Adroit Tag Synchronization

General | Details

Source TSS Running

Level	Date and Time	Source
(i) Information	2015-08-03 14:46:46	Adroit Tag Synchronization
(i) Information	2015-08-03 14:46:46	Adroit Tag Synchronization
(i) Information	2015-08-03 14:46:43	Adroit Tag Synchronization
(i) Information	2015-08-03 14:46:43	Adroit Tag Synchronization Service

Event 0, Adroit Tag Synchronization

General | Details

Connected to local agent server

Level	Date and Time	Source
(i) Information	2015-08-03 16:32:41	Adroit Tag Synchronization
(i) Information	2015-08-03 16:32:32	Adroit Tag Synchronization
(i) Information	2015-08-03 16:32:27	Adroit Tag Synchronization
(i) Information	2015-08-03 16:32:27	Adroit Tag Synchronization
(i) Information	2015-08-03 16:32:24	Adroit Tag Synchronization

Event 0, Adroit Tag Synchronization

General | Details

Connecting to: 192.168.1.32 on port 2055

Level	Date and Time	Source
(i) Information	2015-08-03 16:32:41	Adroit Tag Synchronization
(i) Information	2015-08-03 16:32:32	Adroit Tag Synchronization
(i) Information	2015-08-03 16:32:27	Adroit Tag Synchronization
(i) Information	2015-08-03 16:32:27	Adroit Tag Synchronization
(i) Information	2015-08-03 16:32:24	Adroit Tag Synchronization

Event 0, Adroit Tag Synchronization

General | Details

Connected to destination TSS 192.168.1.32 on port 2055

Finally, some typical Windows Event Log messages on the destination server…

Source: Adroit Tag Synchronization Service (3)

ⓘ Information	03/08/2015 16:32:22	Adroit Tag Synchronization Service
ⓘ Information	03/08/2015 16:30:42	Adroit Tag Synchronization Service

Event 0, Adroit Tag Synchronization Service

General | Details

Service started successfully.

Level	Date and Time	Source
ⓘ Information	03/08/2015 14:47:20	Adroit Tag Synchronization
ⓘ Information	03/08/2015 14:47:13	Adroit Tag Synchronization
Source: Adroit Tag Synchronization Service (3)		
ⓘ Information	03/08/2015 16:32:22	Adroit Tag Synchronization Service
ⓘ Information	03/08/2015 16:30:42	Adroit Tag Synchronization Service

Event 0, Adroit Tag Synchronization

General | Details

Destination TSS Running

Level	Date and Time	Source
ⓘ Information	03/08/2015 14:47:31	Adroit Tag Synchronization
ⓘ Information	03/08/2015 14:47:20	Adroit Tag Synchronization
ⓘ Information	03/08/2015 14:47:13	Adroit Tag Synchronization
Source: Adroit Tag Synchronization Service (3)		
ⓘ Information	03/08/2015 16:32:22	Adroit Tag Synchronization Service

Event 0, Adroit Tag Synchronization

General | Details

Connected to local agent server

ⓘ Information	03/08/2015 16:30:42	Adroit Tag Synchronization
ⓘ Information	03/08/2015 14:47:31	Adroit Tag Synchronization
ⓘ Information	03/08/2015 14:47:20	Adroit Tag Synchronization
ⓘ Information	03/08/2015 14:47:13	Adroit Tag Synchronization

Event 0, Adroit Tag Synchronization

General | Details

Connected to source TSS

Adroit Technologies Limited
P O Box 19
Nantwich
Cheshire
CW5 6FF
United Kingdom
Tel +44 1270 627072
Fax +44 1270 629399
Email: info@adroit-europe.com
Web: www.adroit-europe.com