SETIIDS _ TEI EMETRY	Revision	0.15
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Telemetry overview

Within Toolset you can configure a telemetry stream to allow a proper connection to the car.

Configure device telemetry transmit (Tx)

For telemetry to be supported, you must enable it via the **Telemetry** node. Click + to add a new telemetry table. You can use the import and export tools to import and export existing telemetry tables between setups (2). Use the 'bin' tool to delete unwanted telemetry tables (3). When a telemetry table is added, channels are automatically generated to report the telemetry transmission status. Click the 'wrench' tool to configure these generated channels (4).



This allows you to configure the automatically generated transmission and reception status channels. Here you can modify the interval before EOL information is transmitted (this is useful if you know there is poor reception at the EOL, allowing you to postpone the transmission until you are in a better reception area.) The EOL repeat count and interval are fixed at 4s and 0.5s respectively.

Transmission Information		Reception Information		
Define the names of the channels generated for the transmission of telemetry data. These channels are available on the device.		Define the names of the channels generated for the reception of telemetry data. These channels will be added to the telemetry data when is received. They are not available for use on the device.		
Transmission Throughput Prefix Tel Tx Throughput		,		
Amount of Data Sent Prefix	Tel Tx Bytes	Coverage	Tel Rx Coverage	
Transmission Status	Tel Tx Status	Number of Packets	Tel Tx Packets	
Wait for 0.00	seconds before transmitting	Reception Throughput	Tel Rx Throughput	
end of lap information.		Number of Bad Packets	Tel Rx Bad Packets	
Telemetry Logging		Amount of Bad Data Received	Tel Rx Bad Bytes	
Update the contents of any lo	gged telemetry data whenever a	Reception Status	Tel Rx Status	
End of lap	event is received.			



Configure PC telemetry receive (Rx)

You must define the source used, together with where the data is downloaded via **Settings > Telemetry**. Click **Add telemetry source** (1), rename the telemetry source (2) and select the telemetry source type from the dropdown menu (3).

Data	((*)) Live Dat	a Actions	1 Setups	Channels	Settings	
tings Telemetry Source Configuration						
Configure	e your sources of					
Nam	Id telemetry source	e	79	2		
Туре	c	osworth P192S	v v			
Port	c c	osworth P192S osworth P900		2		
Baud	Rate C	ustom Serial hernet (TCP)		3		
	Ta	oolset Server SM Serial Radio				
		· · · · · ·				
	Data Telemet Configur 1 Add Name Type Port Baud	Data (∞) Live Dat	Data ((*) Live Data Actions Telemetry Source Configuration Configure your sources of telemetry data. Image: Opt of the state Example Telemetry Source Name Name Cosworth P192S Port Cosworth P192S Port Cosworth P192S Baud Rate Custom Serial Ethernet (TCP) Ethernet (UDP) Toolset Server GSM Serial Radio	Data ((*) Live Data Actions Setups Telemetry Source Configuration Configure your sources of telemetry data. Image: Configure your source Image: Configure your source Name Example Telemetry Source Type Cosworth P192S Port Cosworth P192S Baud Rate Custom Serial Ethernet (TCP) Ethernet (UDP) Toolset Server GSM Serial Radio	Data (∞) Live Data Actions Setups Channels Telemetry Source Configuration Configure your sources of telemetry data. Image: Configure your source 2 Image: Configure your your your your your your your your	

When a source type is added, you are prompted to configure the telemetry port settings. Some telemetry source type settings are predefined, such as the Cosworth P192. You can configure custom serial and Ethernet ports. Select the required port to connect to your pit stand receiver. Select a telemetry source, and then click the 'bin' icon to delete it.

🕇 🥽 Antares8xx #198	Data	((*)) Live Data	Actions	▲ Setups	Channels	Settings	
Global Settings	Telemetr	y Source Configura	ation				
Network	Configure	your sources of telem	netry data.				
Data Offload		d telemetry source					
	Name	Exampl	e Telemetry Sou	rce			
Telemetry*	Туре	Coswo	rth P192S	×			
Diagnostics	Port	Intel(R	Active Manage	ment Technolo 🔻			
1 Upgrade	Baud	Rate 19200					



If you need to allow others to connect to your machine to view telemetry, select the **Share telemetry** option in the **Telemetry Sever Configuration** section. Keep the default values for both ports.

elemetry Server Configurat	ion	
Configure how telemetry data is	to be sha	ared from this machine.
Share telemetry on port	51413	(Toolset clients)

You can add several telemetry sources with a single machine as the server PC (see **Error! Reference source not found.**). You can choose to log the data that is received from the telemetry stream as well as the frequency at which it is updated. Select the **Update logged data every...** option and enter a value between 20 and 900 seconds.

	Telemetry Logging
	Configure how logged data should be generated from received telemetry.
1	✓ Log telemetry data
2	✓ Update logged data every 20 s (min 20, max 900)

Once sources are configured you must save the configuration. Click **Save**. You can also select **Reset** to return to the default configuration.



Configure logged telemetry data

To change the relative path of logged telemetry data, select the **Settings** tab and click **Data Offload**. Look in the **Offload Paths** section to find the **Relative Path**. At the beginning of the path add '<source>\'. This creates a specific folder for telemetry data and logged data. For more information about saving logged data, see the <u>Settings</u> guide.

Offload Paths	
Configure where of offloaded data.	outings are offloaded to. The root path is combined with the relative path to form the complete path and filename for
Root Path	C:\Pi Research\Logged Data
Relative Path	<source/> \ <track/> \ <type>\<driver>-<session>.<outing>.<first lap="">.pds</first></outing></session></driver></type>
	Relative path tokens (e.g. <year>) will be replaced with their respective values when offloading.</year>

Once a telemetry table is added on the **Telemetry** node of the device setup, enter a name for the table (1) and select **Enabled** (2). Deselect this option to disable a table without deleting it.

Note: You must configure the channel rates for the channels within the telemetry table to allow them to be transmitted and received. Click **Edit Channel Rates** to navigate to the **Channel Rates** node (3). You can enter a description of the table (4). Multiple telemetry tables can be added to a setup.

	General
	Configure the general settings for this telemetry table.
1	Name Example Telemetry Tables
2	Enabled 🗹
	Rates 3 Hz Edit Channel Rates
4	Description An example telemetry table for User Guide

You can then configure the type of telemetry from the **Output** dropdown menu. If a Cosworth serial telemetry system is selected, you only need to configure the serial port. If custom serial telemetry is selected, then additional information such as the transmission baud rate and data bits need to be configured. Cosworth devices also support ethernet (UDP) telemetry, which you can configure using the remote IP address and remote port.

The consumed bandwidth of the telemetry table based on the usage of the telemetry logging table is also displayed.

Output		
Configure how data	should be transmitted for this table.	
Output	Ethernet (UDP) Telemetry	~
Bandwidth	12 kbytes/s of 29 kbytes/s (40%)	
Remote IP Address	50010	
Remote Port	2	

Once the setup is sent to the device, the telemetry key is written to the Toolset app data folder: C:Users**[YourAccount]**\AppData\Roaming\Cosworth\Toolset\[Toolset Version]"\TelemetryKeys.

Cached Seturs	10/12/2017 2:20 PM	File folder	
Canabilities Takan Casha	0/26/2017 11:26 AM	File folder	
	9/20/2017 11:20 Alvi	rile folder	
Ja Metadata	10/12/2017 3:33 PM	Filefolder	
PCPrivateDataSets	10/12/2017 3:33 PM	File folder	
🎉 TelemetryKeys	10/12/2017 3:20 PM	File folder	
ChannelDatabase.tcl	10/16/2017 11:05	TCL File	649 KB
CommsManager.bin	10/16/2017 11:05	BIN File	1 KB
DeviceNameCache.bin	9/26/2017 11:26 AM	BIN File	4 KB
Diagnostics.bin	10/16/2017 11:05	BIN File	1 KB
EthernetService.bin	10/16/2017 11:05	BIN File	5 KB
OffloadOptions.bin	10/16/2017 11:05	BIN File	1 KB
Telemetry.bin	10/16/2017 3:30 PM	BIN File	1 KB



Configure telemetry channel logging rates

After you configure your PC telemetry Rx and Toolset telemetry Tx, you must assign rates to the channels transmitted over telemetry. This is done on the **Channel Rates**_node.

The telemetry table is identified by its user-defined name and the 'radio' icon, rather than the device onboard logging 'tape' icon.

Channel Rates					
Channels 🔺	(1) Example Telemetry Tables : Example Rate Group	0	On Board Logging : Example Rate Group	0	
Acceleration X		50 Hz		100 Hz	
Acceleration X Offset		1 Hz		1 Hz	
Acceleration Y		50 Hz		100 Hz	
Acceleration Y Offset		1 Hz		1 Hz	

Watch telemetry channels

To watch telemetry channels, select the **Live Data** tab, and then **Data**. Click **Sources** to check the telemetry connection and information.

Note: the 'radio icon' next to **Live Data** changes from grey to black when there is a working telemetry connection.



Click the + button to add and populate a page. Click on a page name to rename the page. Click the 'pencil' icon to display more buttons (from left to right):

- Add Channel List
- Add Map Control
- Add Tabular Outing Report.

Use the 'Add Channel List' option to add telemetry channels. When you add a page, click the 'wrench' icon to add required channels by selecting them from the **Available channels:** and moving them to the **Displayed channels:** section.

Settings			8
Name	Orientation	Vertical	•
Mode Bar	▼ Bit-field orientation	Horizontal	•
Displayed channels:	Available channels:		
Displayed channels:	 1.5V Supply Voltage 1Hz Overruns 1Hz Utilization 1kHz Overruns 1kHz Utilization 2Hz Overruns 2Hz Utilization 3.3V Supply Voltage 5Hz Overruns 	2	
	start typing to filter	the channels	\otimes
-	☑ Show All ☑ Show Diagnostic	Channels	

In the **Sources** section you can check the state of the telemetry link and view the target directory for the logged telemetry data. In the **General** section you can view the name of the source, the device, and the setup. In the **Connection** section you can see if your source is enabled and have the option to refresh the connection. In the **Status** section you can view status of the telemetry connection and information about the connection. In the **Telemetry Logging** section, you can view the status and destination of the logged data.

General			
General information about this tel	emetry source.		
Name	Team Telemetry		
Source	Intel(R) Active Management Techn	nology - SOL (COM3)	
Device	No Device Connected		
Setup			
Connection			
Options for enabling and connect	ng this telemetry source.		
Enabled	V		
Reconnect	Olick to refresh connection.		
Status			
Information about the status of th	s telemetry source.		
Telemetry Rx Status	Awaiting Data		Connected
Telemetry Coverage			0%
Number of Telemetry Packets	0		
Telemetry Rx Throughput	0 bytes/s		
Number of Bad Telemetry Packe	ts 0		
Amount of Bad Data Received	0 bytes		
Telemetry Logging			
Information about logging the dat	a received from the radio.		
Logging Status	Disabled		
File Name			Ô
			(Update Now



Use Cosworth Live On Air (LOA) as a telemetry source

It is recommended that you use the pit stand as a common connection point for all connected users on Toolset. Point the pit stand to Cosworth to establish connection to the stream, configure it as a Toolset server connection, and then point the stream to each engineer connected and using telemetry. This allows connected users to receive telemetry through the desktop.

With the pit stand configured, the DAG points to Cosworth to establish the initial telemetry connection (if a telemetry key is available). The DAG then connects to the pit stand as a Toolset server. This distributes the telemetry key to the pit stand and provides it to connected engineers to avoid loss in telemetry if the DAG disconnects. Finally, each engineer can point their device to Cosworth directly to make sure that they also have a direct connection to the stream in case other devices disconnect or fail.

On the pit stand desktop, go to **Settings > Telemetry**. Click **Add telemetry source** and select 'Custom Ethernet' from the **Type** dropdown box. The **Location** is 'Cosworth's IP Address', and the **Port** is '74', followed by the 'Car Number'.

Next, add a new source for each engineer on the team who use telemetry. Each of these sources is a Toolset server connection. The **Location** for each engineer is their IP address, and the **Port** is '51413'. This completes the desktop setup and the configuration is saved for future use.

felemetry Sourc	e Configuration		
Add teleme	etry source Set default		
Name		Name	Fngineer #1
Type	Custom Ethernet	Type	Toolset Server
Location	Cosworth's IP Address	Location	Engineer #1 IP Address
Port	74(Car Number)	Port	51413
	✓ Default		
Location Port	Cosworth's IP Address 74(Car Number) ✓ Default	Location Port	Engineer #1 IP Address

The DAG also needs a custom ethernet connection to Cosworth. The **Location** is 'Cosworth's IP Address' and the **Port** is '74', followed by the 'Car Number'. The DAG also points a Toolset server connection to the pit stand desktop. The **Location** is the 'Desktop's IP Address' and the **Port** is '51413 (Default)'. This pushes the telemetry key to the desktop, and then to each engineer.

figure your so	urces of telemetry data.		
Add teleme	try source Set default		
Name	LOA	Name	Pit Stand
Туре	Custom Ethernet 🔹	Туре	Toolset Server 🔹
Location	Cosworth's IP Address	Location	Pit Stand IP Address
Port	74(Car Number)	Port	51413
	✓ Default		

Each engineer only needs a 'Custom Ethernet' connection to Cosworth. The Location is 'Cosworth's IP Address' and the **Port** is '74', followed by the 'Car Number'. There is no need for a server connection because the pit stand pushes the key to each engineer.

nigure your so	urces of telemetry data.
Add teleme	try source 🖉 Set default
Name	LOA
Туре	Custom Ethernet
Location	Cosworth's IP Address
	74/Car Numb

Add a real-time outing to Toolbox

With an active telemetry connection open Toolbox and create a new task. Right-click the task and select **Add Real-time Outing**.

Tasks	
Task 3	Select +
100	Add Outing
	Add Real-time Outing
	Paste Outing
	Connect
	Add Task
	Delete
	Refresh
	Refresh All

If you have telemetry via Toolset, the default settings will work. The **Server** is your own machine (localhost) and the **Port** is 51414 (the default).

Outing Typ	e
Oirect	connection to server (use to connect to a Toolset server).
🔘 Broad	cast (use to connect to one or more Sigma servers).
Server —	
Specify t	ne host name or IP address and port number of the server.
Server	localhost
Port	51414 ว
Source —	
Specify t server su	ne real-time data source. You can choose a specific source if your pports multiple sources.
Туре	Oefault ON Named
Source	- C
	OK Cancel Help
	OK Cancel Help

Once this is complete, a real-time outing is created and Toolbox telemetry established.