



Drive-to-Drive Data Exchange with Tria-Link

Application Note 142

This application note describes how to setup direct drive-to-drive data exchange with Tria-Link.

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1 Introduction

Triamec Motion AG products are capable of drive-to-drive data exchange with a 10kHz rate. This feature is available only in a *Tria-Link* fieldbus setup.

The main purpose is to send data directly to where it is used, cyclically and without detours. This is key to complex applications where multiple devices exchange process relevant data.

This application note describes how to setup such data exchange and its specification.

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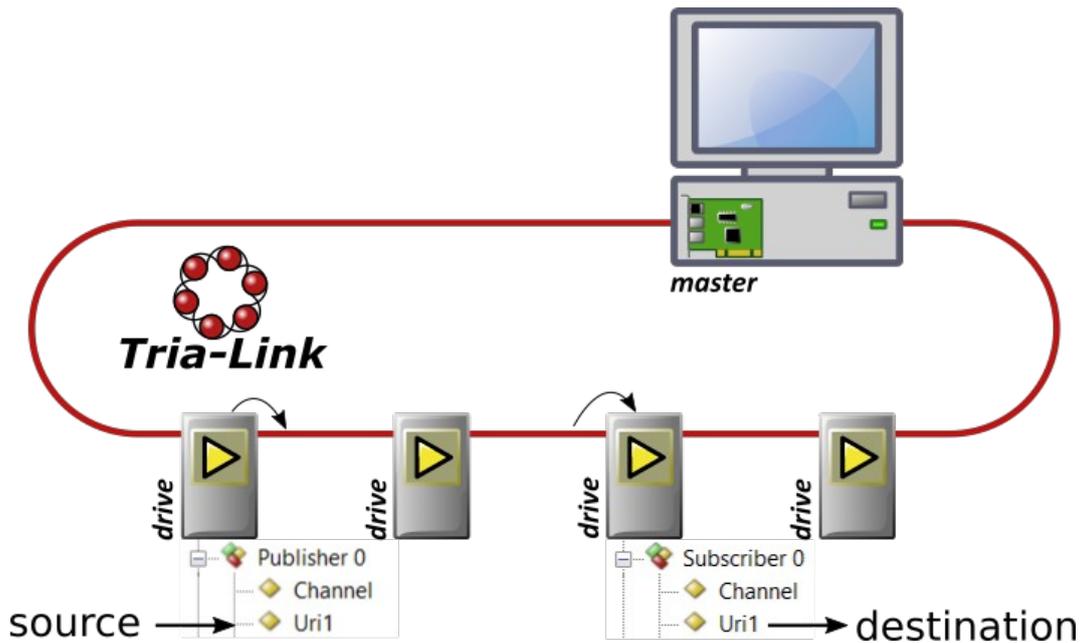


Figure 1: Drive-to-Drive data exchange concept

2 Configuration

The method described in the following is called the *Tria-Link* channel method. Data can be sent flexibly from publisher to subscribers. We first describe the channel concept and then how to setup the publisher and the subscriber settings.

2.1 Payload and Channels

The data is exchanged using packets of data. These packets of data have the following properties.

- The packets are exchanged at a fixed rate of 10kHz.
- Each packet contains a payload of 6 values.
- Value types can be mixed within one packet.
- A standard value is either a 32Bit integer or a 32Bit float.
- Any two of these values can be combined to a 64Bit double or 64Bit integer.

The header of these packets identifies the packet as a *Tria-Link* channel packet with a channel identifier.

- One drive can publish 4 channels concurrently.
This gives a maximum of 24 values sent out cyclically per drive.
- One drive can subscribe up to 3 channels concurrently.
This gives a maximum of 18 values received cyclically per drive.
- 16 Channels are allowed on the *Tria-Link* concurrently.
This gives a total of 96 values exchanged on the *Tria-Link*.

The channel identifier is unique on the *Tria-Link* ring and can be chosen by the customer from a pool of sixteen available identifiers. If two drives publish data using the same channel identifier, an error is generated on the subscriber side. Data can be received by more than one subscriber concurrently. This can

be used, i.e. to publish one analog input signal from one drive to multiple drives that use this data.

2.2 URI Address

The data exchanged between publisher and subscribers can be specified flexibly.

- Any register value of a drive can be published, but preferably registers from the category Signals.
- Subscriptions are restricted to the following registers.
 - ♦ Any Commands register.
 - ♦ Any Application register, preferably working with the Variables category.

Each register in a drive has a unique address, called the *URI Address*. This address is used to specify:

- the source on the publisher drive, and
- the destination on the subscriber drive.

2.3 Setting up the publisher

Any drive that is set up to send data is called a publisher. Navigate to one of the four publishers of this drive at `General.Parameters.Trialink.Publishers[]`, figure 2.

Register	Actual	Prepare	Unit	Description
Channel	Disabled	Disabled	-	Specify to which channel the data should be published
Uri1	General/Signals/DcBusVoltage	General/Signals/DcBusVoltage	-	The address of the source register
Uri2		dcbusc	-	The address of the source register
Uri3		General/Signals/DcBusCurrent		
Uri4		General/Signals/DcBusCurrentSquared		
Uri5		General/Signals/DcBusCurrentSquaredMax		
Uri6			-	The address of the source register

Figure 2: Tab view of a publisher

The Uri addresses are entered with help of an auto completion list.

The channel is currently Disabled, which means it will not publish data to the *Tria-Link*. Now choose one of the 16 global channel identifiers in the register Channel. This must be unique over the whole *Tria-Link* bus.

Any six registers of the drive can now be specified for being published on this channel. Set up the registers Uri1 to Uri6 by committing an *URI Address*. The data will be copied from the specified registers and sent to the *Tria-Link*.

Special case for 64-bit values

All channels are defined to carry six slots of 32 bits. To share 64-bit floating point values or 64-bit integer values two 32-bit slots are required. This is automatically set up and indicated as you choose a 64-bit register, as indicated in figure 3.

Register	Actual
Channel	Channel1
Uri1	Axes[0]/Signals/PathPlanner/Position
Uri2	- Reserved for previous 64-bit Register -
Uri3	Axes[0]/Signals/PathPlanner/Velocity
Uri4	Axes[0]/Signals/PathPlanner/Acceleration

Figure 3: 64-bit registers occupy two slots

2.4 Setting up the subscriber

Any drive that is setup to receive data is called a subscriber. Navigate to one of the three subscribers of this drive at `General.Parameters.Trialink.Subscribers[]`. A subscriber inherits the same registers as a publisher and therefore looks the same (2).

The Channel is set to Disabled, if not used. To receive data from the *Tria-Link*, choose one of the 16 global channel identifiers in the register Channel. This must be a channel that is active on a publisher drive.

Any six registers of the subscriber drive can now be specified in `Uri1` to `Uri6`. The data received on the defined channel will be copied from the *Tria-Link* and saved to the destination registers.

3 Timing

The *Tria-Link* has the advantage of direct drive-to-drive data exchange with low latency. The *Tria-Link* has a 10kHz communication rate and therefore also the direct drive-to-drive data exchange is bound to this rate.

The data exchange always takes one full communication cycle of 100µs. New data is always propagated in the next cycle from the moment it is ready. Referring to cycles, the following steps apply (see also 4):

- The data is set and ready to publish in cycle 0.
- It is then transmitted to all subscribers in cycle 1.
- Finally the data is ready to use from the start of cycle 2.

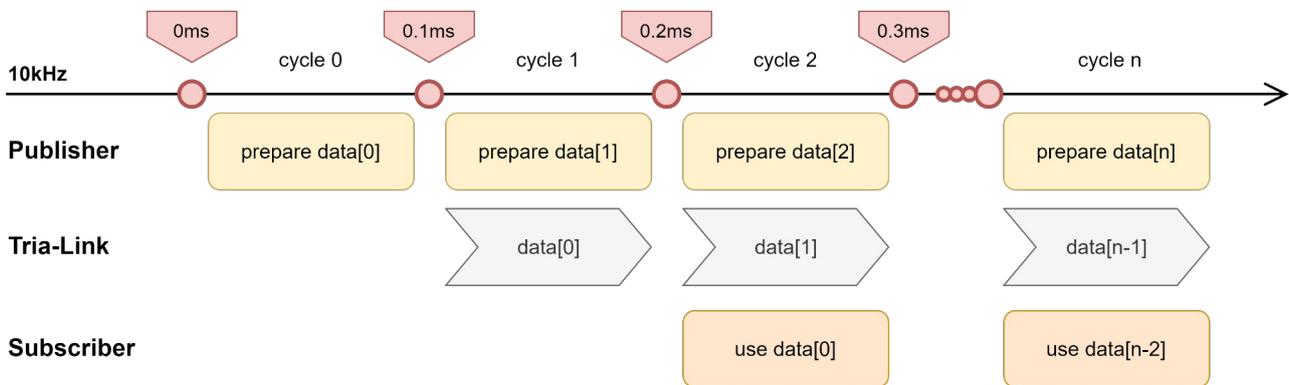


Figure 4: Timing in drive-to-drive data exchange

The same timing rules apply for round trips or man in the middle processing. To process data on an other drive and send it back it will take two transmission cycles and one process cycle in between. This results in 3 cycles delay.

Note Subscribed data is ready to use in the register at the start of the cycle. It is possible to read new data, process it and publish the result within the same cycle.

4 Monitoring

In order to review the channel setup, bring up the Tria-Link Monitor [1] from the link context menu, as



Figure 5: The Tria-Link Monitor allows to check all configured channels in one view. In this example, there is only one station publishing on channels 1 and 3, and getting values from channels 2 and 4.

shown in figure 5. In a sane configuration, each channel in use must occur in both publisher and subscriber columns.

References

[1] “Tria-Link Monitor”, AN146_TriaLink-Monitor_EP003.pdf, Triamec Motion AG, 2022

Revision History

Version	Date	Editor	Comment
001	2022-05-16	Mvx, sm	First Release
		sm	Add figure 1
002	2023-11-23	chm	Add chapter 4: Monitoring, Adopt to TAM Software 7.25.0

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