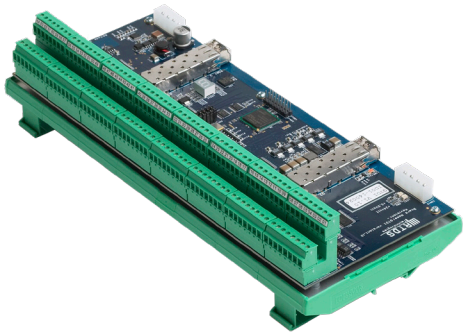
HARDWARE

# GTIO CARDS

The Giga-Transceiver Input/Output (GTIO) cards have been developed for use with NovaCor and are driven from the Giga-Transceiver (GT) optical ports provided on NovaCor. To allow greater freedom of connection and flexibility, the cards have been designed to allow a daisy-chain connection between them. Depending on the configuration, as many as 8 GTIO cards can be connected to each NovaCor GT port.

The physical link between the NovaCor and the GTIO cards is provided by a fibre optic cable with industry standard LC connectors. The GTIO cards are normally mounted on DIN rails in the rear of the RTDS® Simulator cubicle. However, the 2 Gbit/s bandwidth of the link allows the GT-I/O cards to be located up to 100 metres from the RTDS Simulator cubicles.

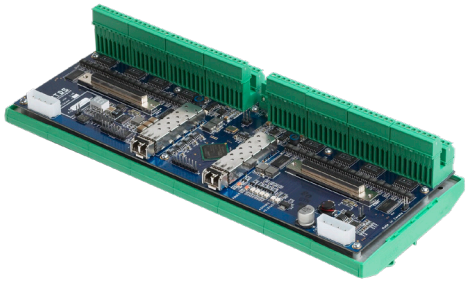
Each GTIO card can operate in the main timestep (~25-50 µs ) or substep (~1-3 µs ) simulations.



## GTDI: GIGA-TRANSCEIVER DIGITAL INPUT CARD

The GTDI input is current-driven (~10 mA), allowing a wide range of input voltages to be connected to the card by providing the appropriate value of current limiting resistor.

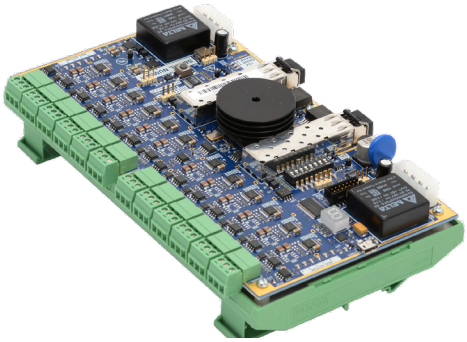
If being used in a substep simulation, the GTDI card should be first in the daisy chain.



## GTDO: GIGA-TRANSCEIVER DIGITAL OUTPUT CARD

The GTDO provides optically isolated digital output from the simulation to external equipment. The card has a total of 64 outputs that can be sent from the simulation running on NovaCor.

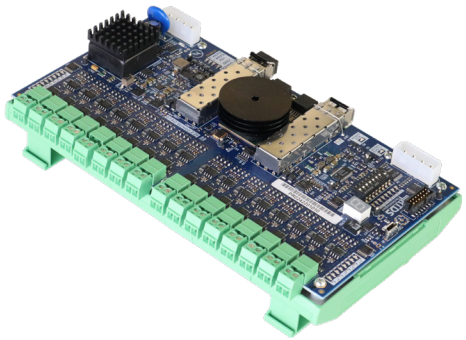
The GTDO has a source-driven output that can provide up to 100 mA per channel with a voltage supply range from +5 to +30 Vdc.



## GTAI: GIGA-TRANSCEIVER ANALOGUE INPUT CARD

The GTAI provides optically isolated analogue inputs from external equipment to the simulation. The card has a total of 12 true differential inputs which can be read by simulation components running on NovaCor.

The GTAI can provide updates to NovaCor at 1 µs intervals. The GTAI input can range between a maximum of ± 10 Vpeak.

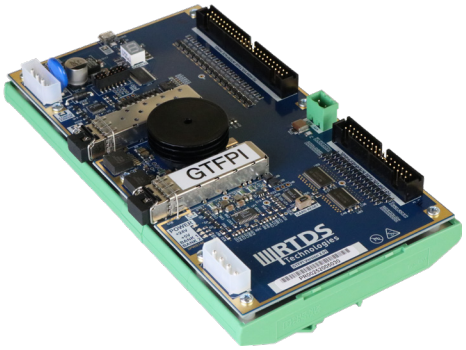


## GTAO - GIGA-TRANSCEIVER ANALOGUE OUTPUT CARD

The GTAO provides optically isolated analogue output from the simulation to external equipment. The card has a total of 16 outputs which can be sent from simulations running on NovaCor.

Special care has been taken in the design of the GTAO to provide the communication bandwidth required for substep applications.

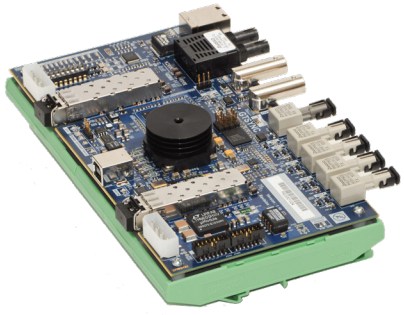
The GTAO output can range between a maximum of ± 10 Vpeak. When operating in a main timestep simulation, the GTAO card can provide oversampling of the output at 1.0 µs intervals.




## GTFPI – GIGA-TRANSCEIVER FRONT PANEL INTERFACE CARD

The GTFPI card is used to read and write signals between the front panel and the RTDS Simulator. The GTFPI can be used with both the TTL level digital I/O panel and the dry contact (high voltage) panel.

Data exchange between the front panels and the GTFPI is via a ribbon cable, while the data exchange between the GTFPI and NovaCor is via a GT port.



## GTSYNC – GIGA-TRANSCEIVER SYNCHRONIZATION CARD

The GTSYNC card is used to synchronize the RTDS simulation timestep to an external time reference (eg. GPS clock) and to synchronize devices under test. The GSYNC connects to its dedicated GT port on NovaCor and cannot be daisy chained to other I/O cards.

The GTSYNC supports 1 Pulse Per Second (1PPS) over BNC coax or ST type fibre connectors, IEEE 1588 over RJ45 or ST fibre connectors as well as IRIG-B over a BNC coax connection. Synchronization of the simulation timestep to an external time reference is necessary for PMU benchmark testing and it is advantageous for IEC 61850-9-2 sampled value output as well as IEC 61850 GOOSE messaging.