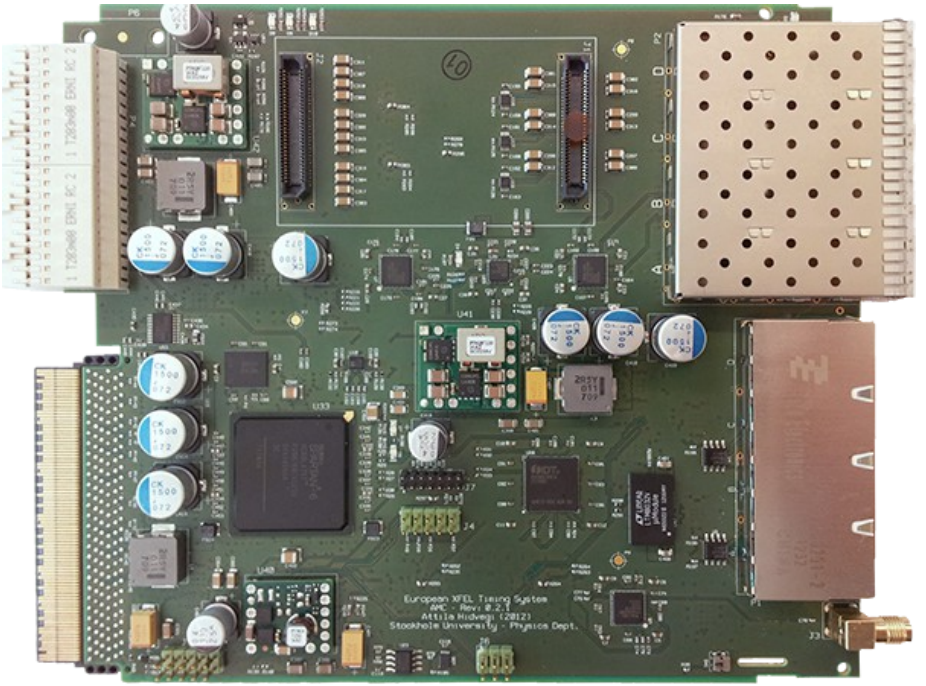
# Update on x2Timer

**Holger Kay**

**DESY - msk**



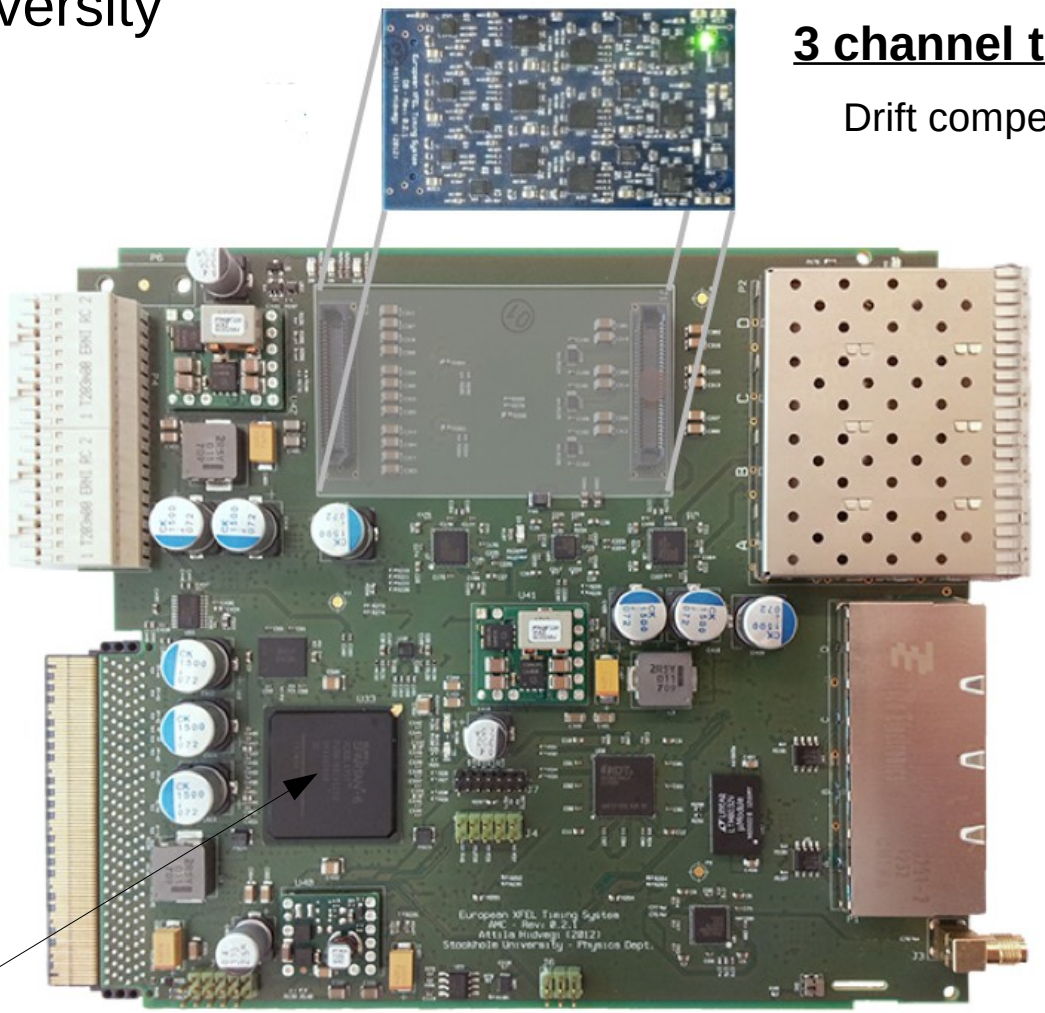
# Overview

1. The interfaces of the x2Timer
2. The RJ45  connectors
3. The RTM connector
4. Working modes of the x2Timer
5. What do we need to update on x2Timer

# 1. The x2Timer board

- Developed by Attila Hidvegi

  Stockholm University



**3 channel transmitter piggyback**

Drift compensation of the fiber cable

**RTM connector**

**4 SFP connectors**

Receive and Transmit

1.3Gbit timing stream

**4 RJ45 connectors**

6 lvds trigger outputs

3 lvds clock outputs

4 lvds trigger inputs

**AMC connector**

8 Triggers 2 Clocks

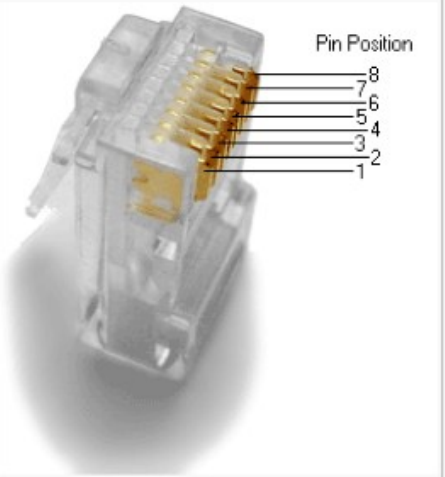
Identical to x1Timer

Spartan 6 FPGA

**RF input**

1.3GHz ref. clock

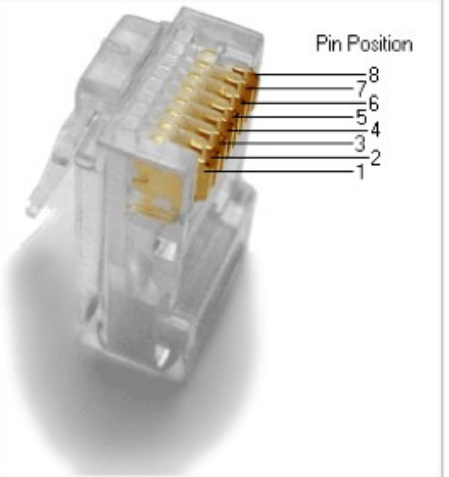
# 2. Rj45 Connector 1, 2 and 3

| | Pin | T568A Pair | T568B Pair | Wire | T568A Color | T568B Color | Pins on plug face (socket is reversed) |
|---|---|---|---|---|---|---|---|
| Clock | 1 | 3 | 2 | tip | white/green stripe | white/orange stripe |  |
| | 2 | 3 | 2 | ring | green solid | orange solid | |
| 5 Volt | 3 | 2 | 3 | tip | white/orange stripe | white/green stripe | |
| Trigger | 4 | 1 | 1 | ring | blue solid | blue solid | |
| | 5 | 1 | 1 | tip | white/blue stripe | white/blue stripe | |
| GND | 6 | 2 | 3 | ring | orange solid | green solid | |
| Trigger | 7 | 4 | 4 | tip | white/brown stripe | white/brown stripe | |
| | 8 | 4 | 4 | ring | brown solid | brown solid | |



- Allows the use of Ethernet patch cable (cheep and easy to handle)
- 2x Trigger and 1 Clock output
- Switchable 5V 250mA (not compatible to Power Over Ethernet)
- Allows active level converters (LVDS to TTL)

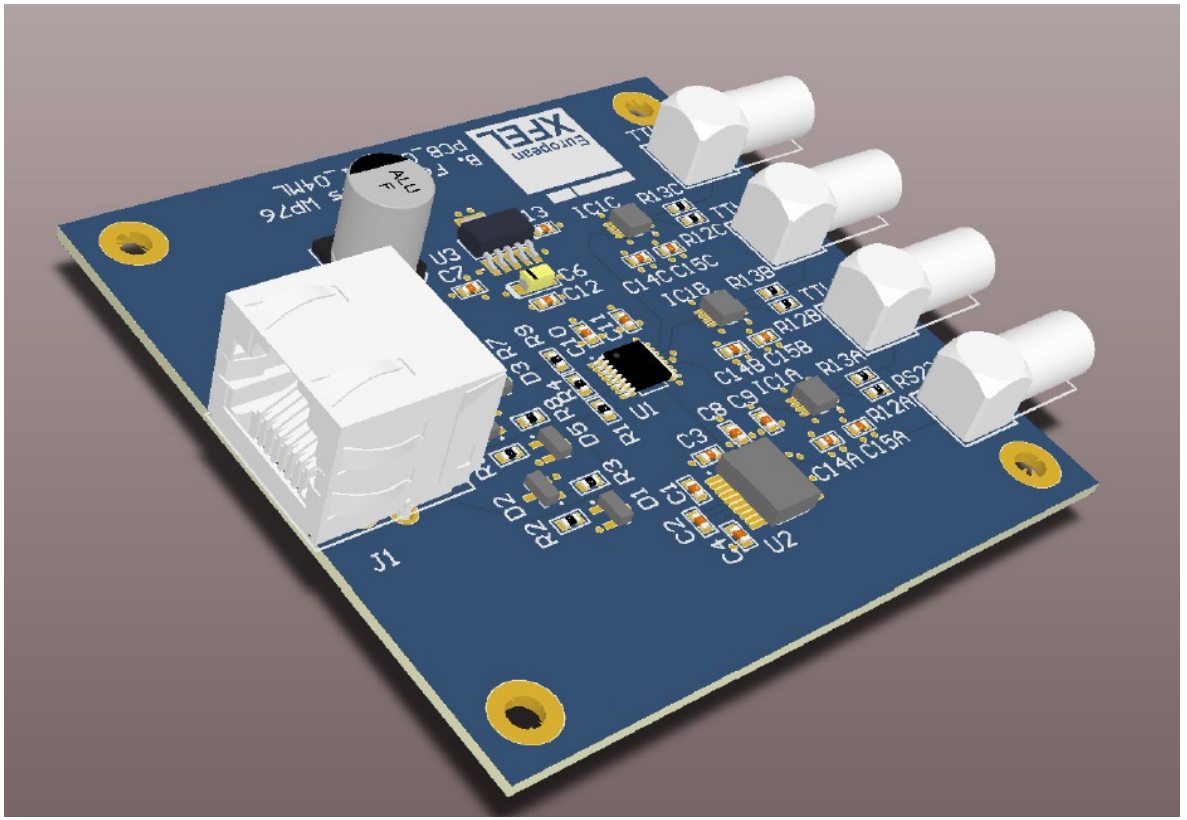
# 2. Rj45 Connector 4

| | Pin | T568A Pair | T568B Pair | Wire | T568A Color | T568B Color | Pins on plug face (socket is reversed) |
|---|---|---|---|---|---|---|---|
| Input 1 | 1 | 3 | 2 | tip | white/green stripe | white/orange stripe |  |
| | 2 | 3 | 2 | ring | green solid | orange solid | |
| Input 4 | 3 | 2 | 3 | tip | white/orange stripe | white/green stripe | |
| Input 2 | 4 | 1 | 1 | ring | blue solid | blue solid | |
| | 5 | 1 | 1 | tip | white/blue stripe | white/blue stripe | |
| Input 4 | 6 | 2 | 3 | ring | orange solid | green solid | |
| Input 3 | 7 | 4 | 4 | tip | white/brown stripe | white/brown stripe | |
| | 8 | 4 | 4 | ring | brown solid | brown solid | |



- This connector has 4 LVDS inputs
- No power supply. Pin 3 and 6 are used for an input

# 2. The activ level converter




- Made by Patrick Gessler and Bruno Fernandes from XFEL
- 2x Trigger output and 1x Clock output with 5V TTL level
- RS232 data output

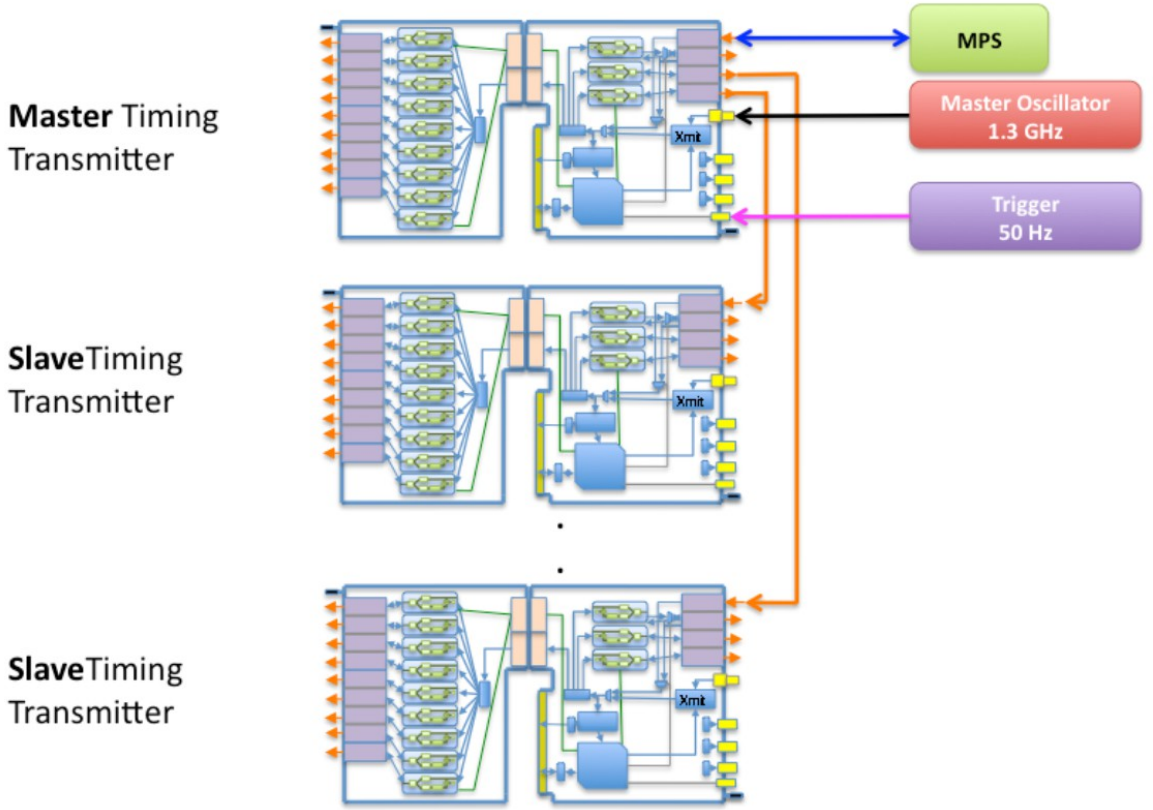
# 3. Signals on the RTM connector

| Signal | Number | Usage |
|---|---|---|
| I2C bus for Piggiback | 9 | Control up to 3 Piggibacks |
| Interrupt | 9 | |
| REF-Clock | 1 | Cable drift compensation |
| Atmel PDI interface | 1 | Piggiback remote firmware update |
| Timing input | 1 | Input and Output for the 1.3Gbit Timing stream |
| Timing output | 1 | |
| I2C bus for SFP connectors | 9 | Configuration of the SFP connectors |
| Trigger signals | 9 | RTM Trigger Outputs |
| 12V , 3.3V | 1 | Power supply |
| JTAG interface | 1 | General purpose Programing interface |
| I2C bus | 1 | General purpose |
| Trigger/Clock input/output | 2 | General purpose connected to FPGA |
| Clock output | 1 | General purpose from clock switch |

# 3. Planned RTM boards

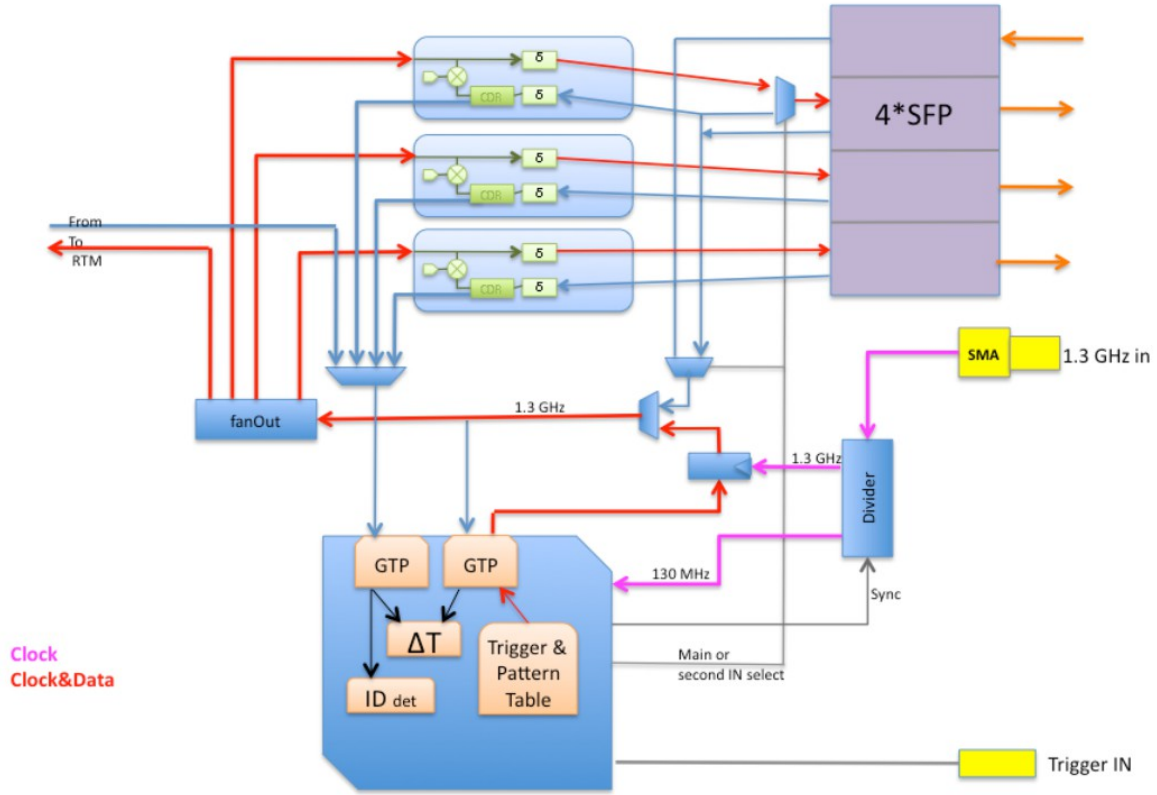
- RTM with 9 SFP connectors only
  - Used for master timing transmitter
- RTM with 9 trigger outputs only
- RTM with both, trigger outputs and SFP connectors
  - Not finaly defined

# 4. x2Timer as timing transmitter



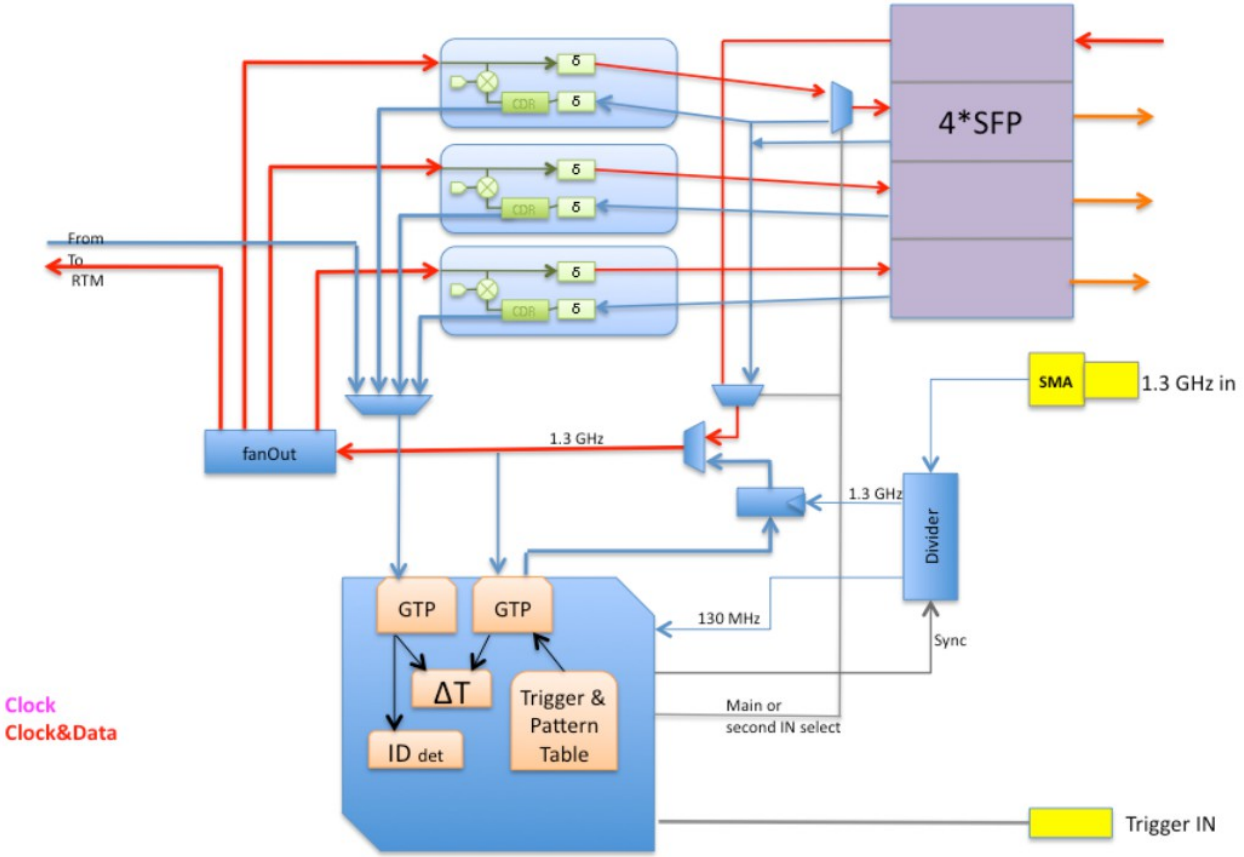

- Master Transmitter becomes signal from MPS, MO and 50Hz sync
- Transmitter distributes timing signal via fiber on RTM and front
- Slave Transmitter redistributes signal from master

# 4. x2Timer as master transmitter



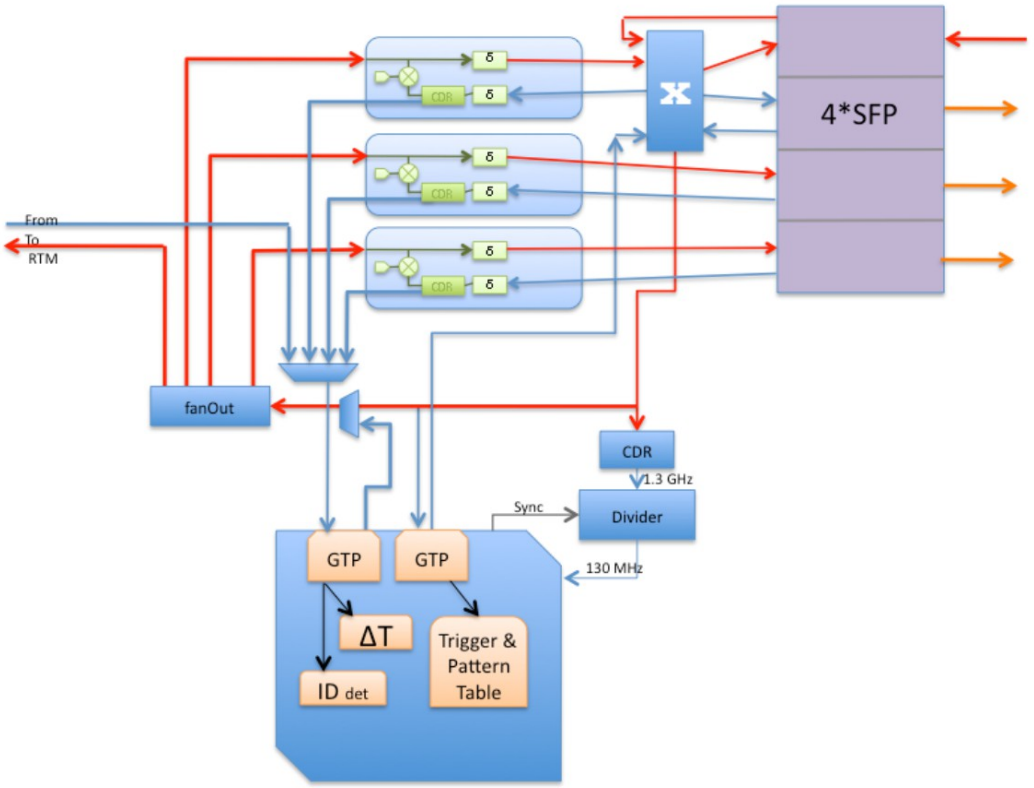

- Reference clock is dividet by 10 to 130MHz
- Timing Data Stream is generated in FPGA
- Timing Data Stream is distributed over cable drift compensation

# 4. x2Timer as slave transmitter




- Slave transmitter redistributes timing signal
- It uses the cable drift compensation for each output

# 4. x2Timer as timing receiver




- Timing receiver recovers the clock via a CDR chip
- It also works as a slave transmitter

# 5. What do we need to update on x2Timer

- Hardware (x2Timer, RTM boards, cable etc.)
- New Firmware,  Driver, Server
- 2 fiber cable between each receiver and transmitter

# Thank you
# for your attention