

# Goals of Timing diagnostic tools

- Reduce number of operators' calls by being proactive.
- Simplify problems detection.
- Let Timing's users diagnose problems in their custom settings and configurations.
- Gather correlated-information from many sources (CCDB, Elasticsearch, logs, JAPC acquisition, ...) into one single place.
- Diagnostics should be easily usable and available over GPN network.
- Read-only tools. No problem of access-control.
- Applications status should be easy to share, what's better than a link?

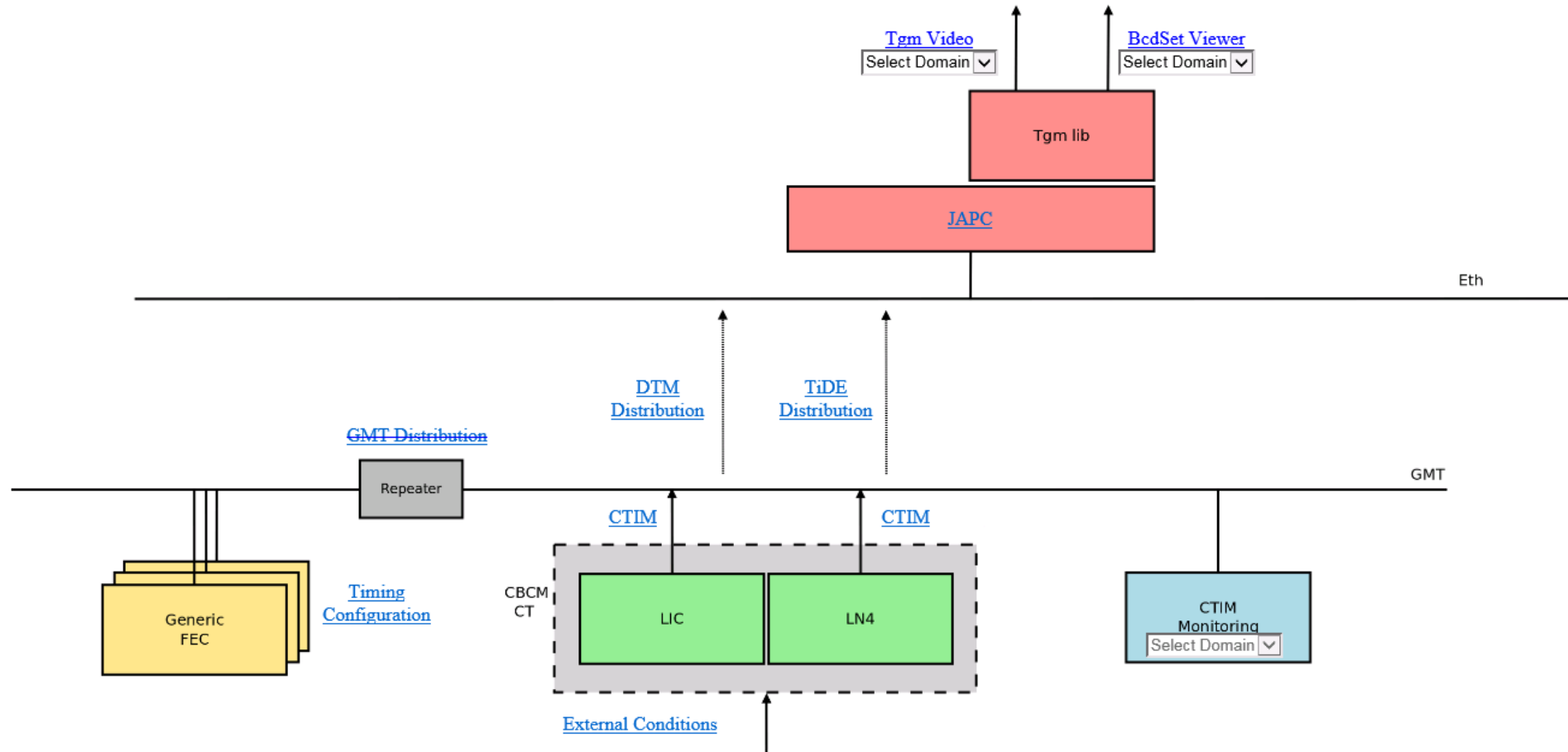
# Who are our users?

- Timing Specialists (specific knowledge of the timing system):
  - Diagnose problems before they cause operational issues.
  - Improve Timing System services through statistics.
- Specialists (FEC specialist,... ) and OPs (high level knowledge of the whole system):
  - Solve configurations problems before calling support.
  - Post-mortem analysis.
  - Check Timing System status in general.

# Which technology?

- Development was not straightforward :
  - First application was developed with pure **HTML + jQuery** (no frameworks). Accomplished on June 2015.
  - Switch to **Sencha ExtJS**: refactoring of the first application and development of other 2 applications. Accomplished on February 2016.
  - Switch to **AngularJS**: development of last timing tool and refactoring of other 3 applications. Accomplished on September 2016.
- Now:
  - Client-side: AngularJS 1.5 + Typescript 1.8 + Bootstrap.
  - Server-side: Spring Boot.

# New Timing Toolbox



# Web Tools List

- LIC & LN4 Central Timing Events Browser.
- External Conditions & Fido Programs.
- TiDE Dashboard.
- FEC Navigator.
- ...

# LIC & LN4 Central Timing Events Browser

## ■ Goals:

- Show relationships between different devices and events in central timing.
- Display configurations and acquisitions for CTIM devices.
- List of real time hardware settings of these devices.
- Gather in a single place information available from different sources (greeting from terminal, getting value from hardware settings, CCDB..).

# LIC & LN4 Central Timing Events Browser

**Diagnostic for Timing**  
LIC & LN4 Central Timing events browser

Environment ↻ 🏠 🔍

**FEC List**

- 📁 All
- 📁 cfv-354-ctmln4gw
- 📁 cfv-774-cttblic
- 📁 cfv-ccr-ctmlc\_old
- 📁 **cfv-ccr-ctmlcgw**

**Clm Tree**

- 📁 Devices for cfv-ccr-ctmlcgw
  - 📁 RX.SYNC-CTML
    - 📁 BX.CZERO-CTML
    - 📁 EX.CZERO-CTML
    - 📁 PX.CZERO-CTML
    - 📁 SX.CZERO-CTML
      - 📁 SEX.F-AWK-MC-CTML
      - 📁 SEX.F-MC-CTML
      - 📁 SEX.S-END-CTML
      - 📁 SEX.S-MC-CTML
      - 📁 SIX.MC-CTML
      - 📁 SX.BEAMDUMP-CTML
        - 📁 **SX.KIKDMPCH-CTML (ID=387)**
        - 📁 SX.KIKDMPTG-CTML (ID=385)
      - 📁 SX.BEAM-OUT-CTML
      - 📁 SX.EA-EACQ-CTML
      - 📁 SX.EA-SACQ-CTML
      - 📁 SX.GEN-ACQ-CTML

Static Data Dynamic Data

Not PPM Dynamic Data for: **SX.KIKDMPCH-CTML**

Control Value (ms)	Lock	Allow Selectable Occurrence Value	Frame
-1	false	false	0x242EFFFF

PPM Dynamic Data for: **SX.KIKDMPCH-CTML**

ID	User	Selector	Acquisition Value	Payload Value	Occurrence
1	ZERO	SPS.USER.ZERO	No Acquisition	0	0
2	SFTPRO1	SPS.USER.SFTPRO1	No Acquisition	0	0
3	SFTPRO2	SPS.USER.SFTPRO2	9289	0	0
4	SFTPRO3	SPS.USER.SFTPRO3	No Acquisition	0	0
5	SFTION1	SPS.USER.SFTION1	No Acquisition	0	0
6	SFTION2	SPS.USER.SFTION2	No Acquisition	0	0
7	SFTION3	SPS.USER.SFTION3	No Acquisition	0	0
8	SFTION4	SPS.USER.SFTION4	No Acquisition	0	0
9	HIRADMT1	SPS.USER.HIRADMT1	No Acquisition	0	0
10	HIRADMT2	SPS.USER.HIRADMT2	No Acquisition	0	0

Console

# External Conditions and FIDO programs

## ■ Goals:

- Put in place a complete monitoring application for external conditions in LIC Central Timing.
- Show their configurations, present status and history.
- Display the last deployed version of FIDO programs.
- Gather in a single place information available from different sources (gathering from terminal, getting value from hardware settings, CCDB, logs..).



# External Conditions and FIDO programs

Diagnostic for Timing

Computer ▾

🔄
🔍
🏠
⚙️

**Timing Domains**

Domain

- CPS
- LEI
- PSB
- SPS

General
History
Monitor

**External Conditions Overview**

Hardware condition
  Hardware/Software condition
  Software condition
 Show All
Hide All
Name

**CPS External Conditions**

PL.SMH42	PL.KFA45	FTN.TARGET	I_P.AD_EXP	PE.STP152	PE.STP176	PE.F61BHZ01_DMP	P.MMON	PE.BTI247	PE.BHZ377	PE.SMH16
PE.SMH57	PE.SMH61	PE.BSW61	PE.F61BHZ01_EA	PE.KFA71-79	PE.BFA_CT	P.VV	PE.VVD3	PE.VVFTA	NEW_GDT	PE.VVSPS
PE.VVFTN	PE.STPFTN	PE.KFA13-21	PE.KFA4	PE.BFA_MTE	PE.STPF61	PE.STPZT8	PE.STPFTA	I_P.AD_TARGET	R_P.EAST_N	R_P.EAST_T8
R_P.NTOF	R_P.AD	R_P.EAST1	R_P.EAST2	R_P.ION1	R_P.ION2	R_P.ION3	R_P.LHC1	R_P.LHC2	R_P.LHC3	R_P.LHC4
R_P.LHCINDIV	R_P.PROBE	R_P.MD1	R_P.MD2	R_P.MD3	R_P.MD4	R_P.MD5	R_P.MD6	R_P.MD7	R_P.MD8	R_P.SFTPRO1
R_P.SFTPRO2	R_P.TOF	I_PS	I_P.PROT	I_P.ION	I_P.MD	I_P.AD	I_P.nTOF	I_P.EAST_N	I_P.EAST_T8	I_P.SPS
R_P.LHC	NEW_UMAT	NEW_CHS	UR_P.EAST_T8	UR_P.EAST_T9	I_P.ADSYNC	UR_P.EAST_T10	UR_P.EAST_T11	R_Seq1	R_Seq2	R_Seq3
R_Seq4	R_Seq5	R_Seq6	R_Seq7	R_Seq8	R_SeqSys	R_BcdSkip	R_SeqTerm			

**SPS External Conditions**

R_S.LHC25NS	R_S.MD3	R_S.COAST	I_S.PS	I_S.PROT	I_S.ION	I_S.MD	I_S.DUMP	I_S.FTARGET	I_S.AWAKE	I_S.TI2
I_S.TI8	I_S.HIRADMAT	R_S.LSEQ_ID0	R_S.LSEQ_ID1	R_S.LSEQ_ID2	R_S.SFTION4	R_S.LHCMD4	R_S.MD4	I_S.LHCSYNC	I_S.SIS_TT60	I_S.SIS_TT66
I_S.SIS_TT40	I_S.SIS_TI2_INJ	I_S.SIS_RING	I_S.SIS_TT41	I_S.SIS_TI2_DUMP	I_S.SIS_TI8_DUMP	I_S.SIS_TT20	I_S.SIS_TI8_INJ	S.EDF	R_S.MPS_STBY	R_S.MPS_CY
I_S.PROT_FT	R_S.LSEQ_PROT	R_H.INJ_SIM	R_S.LSEQ_BB0	R_S.LSEQ_BB1	R_S.LSEQ_BB2	R_S.LSEQ_BB3	R_S.LSEQ_R1	R_S.LSEQ_R2	R_S.LSEQ_CTL	R_S.LSEQ_BB4
R_S.LSEQ_NOM	R_S.LHC50NS	R_S.HBB0	R_S.HBB1	R_S.HBB2	R_S.HBB3	R_S.HBB4	R_S.HRM_TRIG	R_S.SFTPRO3	R_S.SFTION3	R_S.NOM
R_S.LHCMD1	R_S.LHCMD2	R_S.FPulse	R_S.BB4	R_S.Alone	R_S.Coupled	R_S.HIRADMT1	R_S.LHCPILOT	R_S.LHCION2	R_S.MD1	R_S.MD2

**FIDO Programs**

- FileName
- All Fido Progr
- Commons
- CPS
- SPS

**EC Details**

Property	Value
Acquired External Condition	OK
Hardware Condition	BAD
Software Condition	OK
Channel	44
Class Type	Hardware/Software
Description	East beam for target
Enable	true
Name	PE.F61BHZ01_EA
Software Monostable	false

```

            graph LR
            Hw[BAD] --> Enable[Enable]
            Sw[OK] --> Enable
            Enable --> Acquired[OK]
            style Hw fill:#f00,stroke:#333,stroke-width:1px
            style Sw fill:#0f0,stroke:#333,stroke-width:1px
            style Acquired fill:#0f0,stroke:#333,stroke-width:1px
            style Enable fill:#fff,stroke:#333,stroke-width:1px
            
```

# External Conditions and FIDO programs



## ■ Goals:

- Show a set of charts and diagram to display the real-time/history situation of the new Timing Distribution system.
- Monitor smooth transition from DTM to the new distribution over Ethernet.
- Give the users a cardiogram of the current situation (is the problem relative only to my machine or it's a global issue?)
- Integrate with Elasticsearch/Kibana.

# TiDE Dashboard



# TiDE Dashboard

**Diagnostic for Timing**  
TiDE Dashboard

Environment 17:09:11

Quick period: Last 2 d From: 28-09-2016 17:04:12 To: 30-09-2016 17:04:12 Apply Unfreeze Refresh: 1 min Interval: 1 h Show

Filters  
Find Hostname  
Include Exclude

Global CPS CPS - Diagram

Domain Diagram

HostName Ap... .

Include  
\* [x] [x]

Exclude  
\* [x] [x]

Apply Clear All Watch

**cwo-ccc-b7lf**

Pid	Process Name	Timing Doma...	Events Lost	Events Timeo...	Average Que...	Events Lost...	Provider>Distributor>Host
707	...p.jnlp?ccm.login=cpsop_1_6.jws	CPS	262	0	1.3	44	TGM.PROV.CPS.TN.1>TGM.DIST.CPS.TN.1>cwo-ccc-b7lf
707	...p.jnlp?ccm.login=cpsop_1_6.jws	CPS	184	0	1.32	28	TGM.PROV.CPS.TN.2>TGM.DIST.CPS.TN.2>cwo-ccc-b7lf
11531	...mRequest.jnlp?CCM_NR=1_1_6.jws	CPS	82	4	1.14	310	TGM.PROV.CPS.TN.1>TGM.DIST.CPS.TN.1>cwo-ccc-b7lf
11531	...mRequest.jnlp?CCM_NR=1_1_6.jws	CPS	166	18	1.13	946	TGM.PROV.CPS.TN.2>TGM.DIST.CPS.TN.2>cwo-ccc-b7lf
11556	...cription=true&CCM_NR=1_1_6.jws	CPS	0	0	1	0	TGM.PROV.CPS.TN.1>TGM.DIST.CPS.TN.1>cwo-ccc-b7lf
11556	...cription=true&CCM_NR=1_1_6.jws	CPS	0	0	1	0	TGM.PROV.CPS.TN.2>TGM.DIST.CPS.TN.2>cwo-ccc-b7lf

Console

# TiDE Dashboard

**Diagnostic for Timing**  
Tide Dashboard

Environment: [Icons] 17:15:09

Quick period: Last 2 d From: 28-09-2016 17:04:12 To: 30-09-2016 17:04:12 Apply Unfreeze Refresh: 1 min Interval: 1 h Show

Global CPS CPS - Diagram Filtered #1

Include: \* - Exclude: cs-\*

csv-ccr-ade	csv-ccr-cps	csv-ccr-ctf	csv-ccr-gps	csv-ccr-hrs	▲ csv-ccr-larger	csv-ccr-leir	csv-ccr-lhc1	csv-ccr-lhc3	csv-ccr-lin
csv-ccr-pea	csv-ccr-psb	csv-ccr-sps1	csv-ccr-sps2	cwe-1348-awake1	cwe-1348-awake2	cwe-170-rilis	cwe-2001-ctfb	cwe-2008-tbts	cwe-2010-ctf1
cwe-2013-ctf	cwe-37-arf1	cwe-37-arf2	▲ cwe-400-allcr1	cwe-400-allcr2	▲ cwe-400-allcr3	cwe-513-vmw003	▲ cwe-513-vmw378	cwe-513-vol017	cwe-513-vol041
cwe-513-vol066	▲ cwe-513-vol068	▲ cwe-513-vol074	cwe-513-vol102	cwe-513-vol104	▲ cwe-513-vol108	cwe-513-vol128	▲ cwe-513-vol134	cwe-513-vol137	cwe-513-vol142
cwe-513-vol148	cwe-513-vol172	cwe-513-vol179	cwe-513-vol181	cwe-513-vol187	▲ cwe-513-vol201	▲ cwe-513-vol232	cwe-513-vol249	▲ cwe-513-vol251	cwe-513-vol267
cwe-513-vol324	cwe-513-vol327	▲ cwe-513-vow018	cwe-513-vow023	cwe-513-vow030	cwe-513-vow070	cwo-ba2-allcr1	cwo-ba3-bi1	cwo-ba4-bi1	cwo-151-cpsrf
▲ cwo-151-cpsrf2	▲ cwo-152-1ln4	cwo-157-apron	cwo-157-ea	▲ cwo-193-ad1	▲ cwo-193-ad2	▲ cwo-193-ad3	cwo-193-ad4	cwo-193-elena2	▲ cwo-193-hs1
cwo-197-rex2	cwo-2002-lc	cwo-2008-ctf1	cwo-2008-ctf2	cwo-2008-ctf3	▲ cwo-2008-ctf4	▲ cwo-2008-ctf5	▲ cwo-2008-ctf7	cwo-2008-ctf8	cwo-2008-fd1
cwo-2008-lpi	cwo-2008-vac	cwo-2013-ctf1	cwo-233-lei1	cwo-351-lin3	cwo-351-mob	cwo-353-cps1	▲ cwo-353-cps3	▲ cwo-359-cps1	▲ cwo-363-lei1
cwo-363-lei3	▲ cwo-363-lin1	▲ cwo-363-lin2	cwo-363-lin3	▲ cwo-363-lin4	cwo-363-linac	▲ cwo-400-4ln4	cwo-400-5ln4	cwo-508-hie1	▲ cwo-508-hie2
cwo-508-iso	cwo-508-iso2	cwo-508-iso3	cwo-508-iso4	▲ cwo-508-rex	▲ cwo-508-rex2	cwo-508-rex3	cwo-6-1ln4	cwo-6-2ln4	cwo-ba3-cf1
cwo-ba3-cf2	cwo-ba3-cf3	▲ cwo-ccc-a0lc	cwo-ccc-a0lf	cwo-ccc-a1lc	cwo-ccc-a1lf	cwo-ccc-a1ls	cwo-ccc-a3lc	cwo-ccc-a3lx	cwo-ccc-a4lc
cwo-ccc-a4lf	cwo-ccc-a4ls	cwo-ccc-a4lx	▲ cwo-ccc-a5lc	cwo-ccc-a5lf	▲ cwo-ccc-a6lc	cwo-ccc-a6lf	▲ cwo-ccc-a7lc	cwo-ccc-a7lf	cwo-ccc-a8ls

Exclude: cs-\*

Pid	Process Name	Timing Doma...	Events Lost	Events Timeo...	Average Que...	Events Lost...	Provider>Distributor>Host
23495	...ws/ccm_6.12.5/ccm.jnlp_1_6.jws	LN4	64	0	0.9	20	TGM.PROV.LN4.TN.1>TGM.DIST.LN4.TN.1>cwe-513-vol134
23495	...ws/ccm_6.12.5/ccm.jnlp_1_6.jws	LN4	244	0	1.35	58	TGM.PROV.LN4.TN.2>TGM.DIST.LN4.TN.2>cwe-513-vol134
23739	...WORK=CLN4.LN4&CCM_NR=1_1_6.jws	LN4	198	4	1.83	24	TGM.PROV.LN4.TN.1>TGM.DIST.LN4.TN.1>cwe-513-vol134
23739	...WORK=CLN4.LN4&CCM_NR=1_1_6.jws	LN4	122	16	1.17	10	TGM.PROV.LN4.TN.2>TGM.DIST.LN4.TN.2>cwe-513-vol134
26576	...ws/ccm_6.12.5/ccm.jnlp_1_6.jws	LN4	2	0	1.03	4574	TGM.PROV.LN4.TN.1>TGM.DIST.LN4.TN.1>cwe-513-vol134
26576	...ws/ccm_6.12.5/ccm.jnlp_1_6.jws	LN4	56	0	1.03	152	TGM.PROV.LN4.TN.2>TGM.DIST.LN4.TN.2>cwe-513-vol134
26848	...WORK=CLN4.LN4&CCM_NR=1_1_6.jws	LN4	56	6	1.04	1266	TGM.PROV.LN4.TN.1>TGM.DIST.LN4.TN.1>cwe-513-vol134
26848	...WORK=CLN4.LN4&CCM_NR=1_1_6.jws	LN4	54	2	1.04	26	TGM.PROV.LN4.TN.2>TGM.DIST.LN4.TN.2>cwe-513-vol134

Apply Clear All Watch

Console

# Front End Computer Navigator

## ■ Goals:

- Display computers' hardware configurations/installations (how many timing modules are installed, of which type, etc..).
- For each module check out counters' configurations (graphically displaying its wiring/oring set-up).
- Inspect Local Timings (LTIMs devices), CCDB settings, and current hardware set-up.
- Provide easy links to jTimDiag java application.
- Trace libraries and timing devices usages (where, when..?)
- Create global report to identify configurations problem.

# Front End Computer Navigator

The screenshot displays the 'Diagnostic for Timing' software interface. The top navigation bar includes 'Report', 'Logs', and 'Dev. Hosts: Hide'. The main window is divided into several sections:

- Search computer:** Contains a search bar with 'LA1X.SQFDN-3' and filters for 'Lun: All' and 'Channel: All'. Buttons for 'Inspect' and 'Open in JTimDiag' are present.
- Table:** A grid with 10 columns labeled '0' through '9' and rows labeled 'CTRV'. Each cell contains a numbered circle (1-8). The circle in row 3, column 9 is highlighted in green.
- Search LTIM:** A search bar with 'No result found'.
- Timing Diagram:** A detailed diagram for 'cfv-363-cltim -> 7'. It shows inputs: 'PSB\_OPER', 'Timing Cable', 'Ext Start 1' (LTLX.MKVT10), 'Ext Start 2', 'Ext Clk 1', and 'Ext Clk 2'. The diagram features four numbered blocks (1-4) and four XOR gates. The outputs of these gates are: 'LTLX.FKVT10', 'LTLX.WKVT10', 'LTLX.W2KVT10', and 'LTLX.MKVT10'. Checkmarks are visible next to the first three output labels.



- DEMO: [link](#)

# What's next?

- Other tools are currently on our TODO list:
  - GMT Network Statistics: collect CTR statistics on FEC in order to be proactive and detect problems in the timing distribution before they show up.
  - Timing Dashboard: display timing services statuses for a global overview of the timing system.
  - Ltim configuration web tool: to guide users to a correct LTIM definition.
  - “the sky’s the limit” ...

**Questions?**