

# THE INTERCONNECTION OF TINE AND STARS

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## Abstract

We have succeeded to connect TINE (Three-fold Integrated Networking Environment)[1] and STARS (Simple Transmission and Retrieval System)[2][3] with co-development of gateway and bridge programs.

TINE is very powerful system which was developed by DESY and STARS is a very simple message transferring system for small scale control system. At the Photon Factory(KEK), STARS is used for synchrotron radiation beamlines and installation of STARS is still in progress.

Recently, we have started development of a ring information (ring current, life time etc.) distribution system for the beamline with TINE and STARS. Multicast function of TINE works efficiently in this system.

We will describe the detail of connection TINE-STARS and development status of ring information distribution system.

## OVERVIEW OF TINE

TINE is a significant networking environment and it has advantages as follows.

- Multi-Platform (Windows, Unix, Macintosh, VMS, VxWorks, DOS, etc.)
- Multi-Protocol (IP, IPX)
- Multi-Architecture
- Plug and Play

Client and server components are integrated and behave like a "software bus".

Fig. 1 shows image of TINE components and their communication.

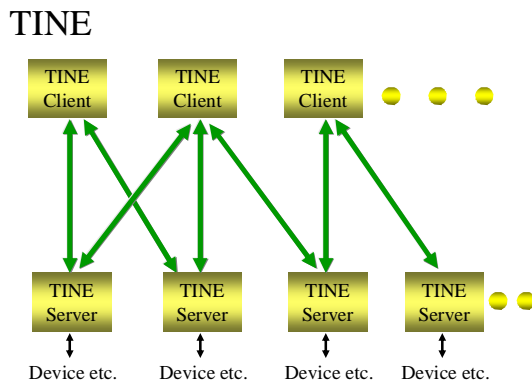


Figure 1: TINE servers and clients.

## OVERVIEW OF STARS

STARS is a message transferring software for small-scale control systems with TCP/IP sockets, which works on various types of operating systems (STARS server is written in Perl). STARS consists of client programs (STARS clients) and a server program (STARS server), and each client is connected to the server via a TCP/IP socket. STARS users can upgrade the system by writing client programs, and STARS clients are able to participate in the system at any time without system stoppage.

STARS server and clients handle only text-based messages and these text messages are transferred through TCP/IP socket. This brings extremely simple architecture for STARS.

### Hierarchical node name

Each client of STARS has its own unique node name. The node name is used to identify nodes at transferring messages. A hierarchically structured system can be developed with the hierarchical node name of STARS. A period (".") is used for the separator and the STARS server uses the first part of the destination. For example, the message which has "Br2.Dev1" as destination will be delivered to "Br2".

Fig. 2 shows example of STARS connection and transferring messages in STARS.

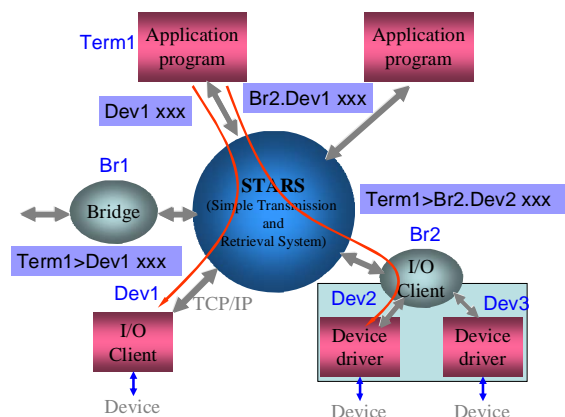


Figure 2: STARS connection and messages.

## THE INTERCONNECTION

We made 2 types of interface (see Fig. 3). One is to access STARS from TINE clients (TINE-STARS gateway) and the other one is to access TINE servers from STARS (TINE bridge). Development of these interfaces is

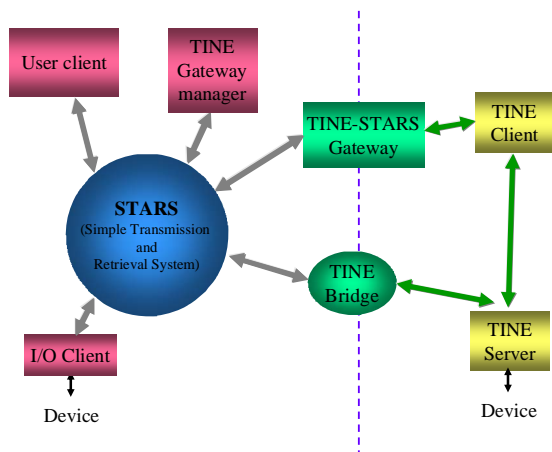


Figure 3: The interconnection TINE and STARS.

still in progress now. We will describe recent version of interfaces here.

### Name space

The name space is very important to identify devices etc. in both systems. TINE uses “Context Name” and “Device Server Name” to specify an equipment module on a FEC (Front End Controller), and “Device Name” to identify an individual device managed by the equipment module. Properties (or methods) of the device are accessed via the device “Property”. STARS uses a straightforward hierarchical structure as its name space. One of the big issues of interconnection is “How to map the name space”.

We mapped TINE device name and property name to the STARS node name by separating identifiers of TINE with the “period” character.

### TINE-STAR gateway

TINE-STAR gateway is used to access STARS from TINE clients. The gateway is basically a STARS client and it looks like a TINE server for TINE clients. The gateway exchanges requests from TINE clients and sends

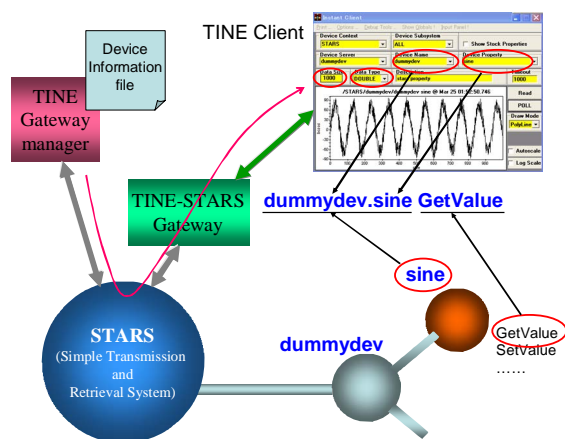


Figure 4: Accessing STARS from TINE client.

or gets corresponding messages from STARS. Then, the TINE-STAR gateway maps the name space between TINE and STARS in both directions. Fig. 4 shows accessing STARS client from TINE and example of mapping STARS name space to TINE.

### Gateway manager

TINE can handle various data types such as CF\_TEXT (C: char, VB: String, Java: char), CF\_LONG (C: long, VB: Long, Java: int), CF\_FLOAT(C: float, VB: Single, Java: float) etc. and user-defined data types are available.

On the other hand STARS does not need to process different data types because STARS handles text messages only. Each STARS client must exchange the text into corresponding data type by itself. This means the TINE-STAR gateway has to know how to convert TINE data types to text and how to parse STARS data text into TINE data types. The gateway manager (also STARS client) does just that!

### TINE bridge

A TINE bridge is used to access TINE servers from STARS. It exchanges name space and data type between

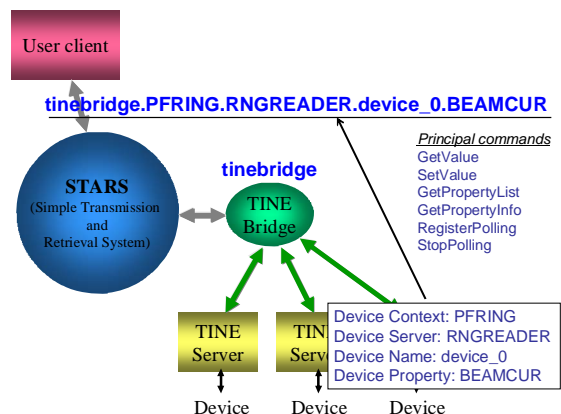


Figure 5: Accessing TINE server from STARS.

TINE and STARS. If the bridge receives “GetValue” or “SetValue” command, the bridge reads or writes corresponding device property of TINE server. Fig. 5 shows example of accessing TINE server from STARS.

The bridge supports attach link and multicast function of TINE then it can get values from TINE server frequently. Device properties must be set in configuration file of TINE bridge at present. Then the bridge sends “\_ChangedValue” event message to the STARS server.

## APPLICATION

At this time, we have developed a beta version of the PF ring information display with TINE and STARS.

The system consists of a TINE server which gets ring status, TINE bridge and “display client” of STARS. The TINE server is connected to PF ring control system and gets information of ring such as beam current, life time, operation mode, gap of undulator etc. Then it sends them

to the TINE bridge frequently with attach link and multicast.

After receiving value, the bridge checks the value has been changed by comparing with previous value. If value has been changed, the bridge sends “\_ChangedValue” message to STARS server.

“display client” sends “GetValue” command to the bridge and get values at starting time. Then it sends

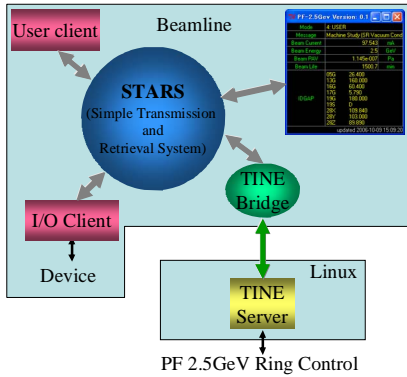


Figure 6: PF ring information display.

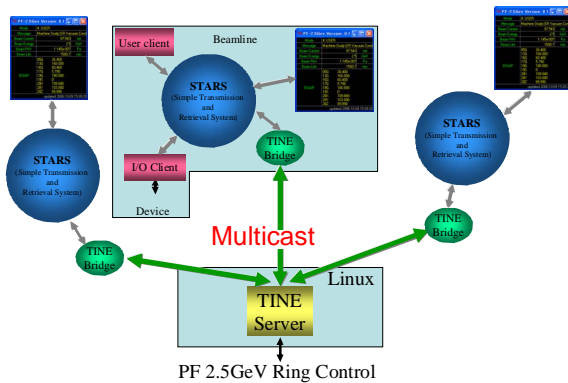


Figure 7: Information display with multicast.

“flgon” command to STARS server and waits event message which shows value has been changed.

Usually this TINE bridge and “display client” will be attached to a STARS server that works on beamline control system. And, we prepared Linux PC for the TINE server and ENS of TINE. The TINE server which gets ring status is running on this PC and waiting for connection from TINE bridges. Fig. 6 shows composition of the system.

We are planning multiple connections as next step. Number of beamline control system attached TINE bridge will run finally. Multicast function of TINE will work effectively (see Fig. 7).

## CONCLUSION

This time we have succeeded to connect TINE and STARS to develop a TINE-STARS gateway, a gateway manager and TINE bridge. This means;

- STARS can connect various systems via tine,
- TINE can connect COACK[4][5][6] etc. via STARS,
- Efficient function on TINE and STARS is available.

At present, there is an unresolved character problem in the name space mapping. TINE allows blanks and other special characters within a device name. STARS, however uses the standard set “A” to “Z”, “a” to “z”, “0” to “9”, as well as “\_” and “-“. Development is still in progress and the problem will be fixed.

## REFERENCES

- [1] <http://adweb.desy.de/mst/tine/>
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