



# Cartography of the Tango Controls

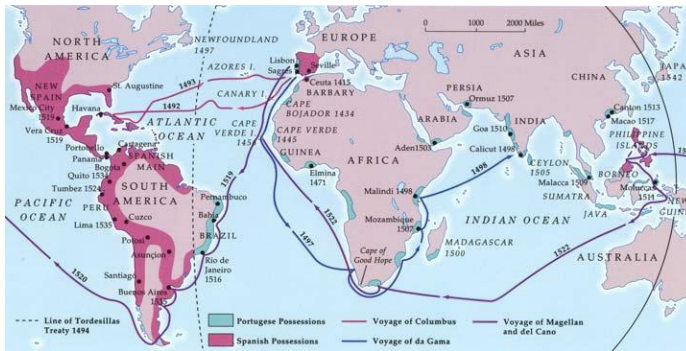
(Status of the RFC project)

Piotr Goryl and Vincent Hardion on behalf of Tango Controls RFC Crew,  
Tango Webinar, 10-06-2020, cyber-space

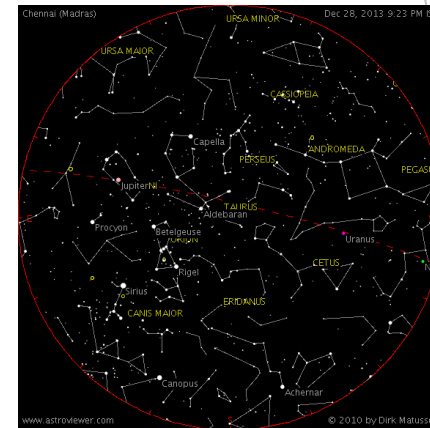


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# First start with a good map



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- 21 topics proposed,
- 13 is required for development of a new Tango prototype

# The cartography (goal)



- ▶ Provide a formal specification of the current (V9 LTS) Tango Controls system.
  - ▶ concepts,
  - ▶ terminology,
  - ▶ protocol behavior,
  - ▶ conventions,
- ▶ It shall be on a sufficient level for:
  - ▶ future evolution of Tango Controls
  - ▶ implementation in other languages
- ▶ Concepts are more important than implementation details.

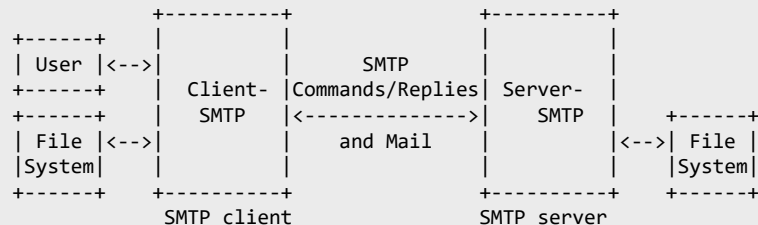
# What is the RFC?

- ▶ RFC means Request For Comments  
(the first RFCs were indeed documents circulating between ARPA researchers for gathering comments)
- ▶ Example: <https://tools.ietf.org/html/rfc5321>

## 2. The SMTP Model

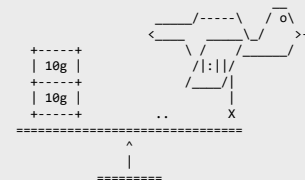
### 2.1. Basic Structure

The SMTP design can be pictured as:



RFC 5321 - SMTP

Weighted fair queueing (WFQ) MAY be implemented using scales, as shown:



Carriers in the queue too long may leave log entries, as shown on the scale.

RFC 2549 - IP over Avian Carriers with QoS



# RFC and COSS

- ▶ RFC means Request For Comments  
(the first RFCs were indeed documents circulating between ARPA researchers for gathering comments)
- ▶ Consensus-Oriented Specification System
  - ▶ Facilitates collaborative specification writing,
  - ▶ Similar to source code peer-review,
  - ▶ Roles for each topic:
    - ▶ An editor - a Tango Collaboration representative
    - ▶ A contributor - anyone from the Tango Community, sending a proposal as a pull request

## The Crew

- ▶ The team is volunteers from the Tango Community,
  - ▶ The team meets every 2 weeks on a telco to synchronise and discuss pending work,
  - ▶ S2Innovation is calling and chairing the meetings and do administration work
- Vincent Hardion (Max IV)
  - David Erb (Max IV)
  - Reynald Bourtembourg (ESRF)
  - Andy Götz (ESRF)
  - Gwenaëlle Abeillé (SOLEIL)
  - Sergi Blanch-Torné (ALBA)
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  - Graziano Scalamera (Elettra)
  - Olga Merkulova (IK)
  - Igor Khokhriakov (IK)
  - Thomas Braun (byte physics)
  - Piotr Goryl (S2Innovation)
  - Michał Liszcz (S2Innovation)



## The ship (tools)

- ▶ Using the Consensus-Oriented Specification System (COSS),
- ▶ Work is conducted on GitHub repository:  
<https://github.com/tango-controls/rfc>
- ▶ Documents are written as .MD format, the ABNF is used for describing a communication tokens,
- ▶ A dedicated Slack channel is used for communication,
- ▶ 3 x Write the RFC (WtRFC) remote workshops





## Goals

An Attribute is a Tango concept representing read and (optionally) write access to this qua

In object oriented terminology, the Attribute object. See [RFC 2/Device](#) for the definition of

## Use Cases

Some example use cases of an Attribute are:

- an Attribute can represent a position of
- an Attribute can represent a temperature

## Specification

An Attribute has:

- A set of static metadata that constitute A
- A set of dynamically configurable proper
- A set of runtime parameters describing /

## Attribute definition

The static metadata is part of the Attribute de implementation and MUST NOT change at ru

An Attribute MUST have associated following

- *name*, a string identifying the Attribute. I  
    <attribute-name> specification below,
- *data type*, an enumeration describing the
- *data format*, an enumeration describing
- *writable*, an enumeration describing the  
    READ\_WITH\_WRITE).
  - An Attribute can be read from, if *wri*
  - An Attribute can be written to, if *wri*
- *display level*, an enumeration describing

Note: Although it is possible to use a wide numbers, ASCII letters (upper- and lower-c client applications. Also note that the Attri digit.

## Definitions

This section offers a number of ABNF formal definitions for entities repeatedly used below in this document.

NOTE: in the below ABNF some basic definitions are used as rules, spaces are replaced with ' '

NOTE: in the below ABNF data types sometimes embedded into the rule e.g. bool:isExcept is equivalent to isExcept = true / false

```
endpoint = URL ; usually with port

SUBSCRIBER_INFO = upstream_device attribute_name action EVENT_TYPE client_id1_ver

SUBSCRIPTION_INFO = server_library_release_ver upstream_device_id1_ver zmq_sub_event_hwm rate ivl zmq_release_ver heartb

EVENT_INFO = EVENT_DATA/1*EVENT_ERROR bool:isExcept ; see below

EVENT_DATA = ATT_CONF_DATA/PIPE_DATA/DATA_READY_DATA/INTERFACE_CHANGE_DATA/ATTRIBUTE_DATA

ATT_CONF_DATA = ATTRIBUTE_PROPERTIES ; Attribute properties from [RFC-4](https://github.com/tango-controls/rfc/blob/draf

PIPE_DATA = int:size name timeVal PIPE_BLOB ; pipeBlob must be defined in [RFC-7](https://github.com/tango-controls/rfc

DATA_READY_DATA = attribute_name data_type int:counter

INTERFACE_CHANGE_DATA = *ATTRIBUTE_PROPERTIES *COMMAND_META_INFO bool:deviceStarted

ATTRIBUTE_DATA = ATTRIBUTE_DEFINITION ; Attribute definition from [RFC-4](https://github.com/tango-controls/rfc/blob/dra

EVENT_ERROR = reason severity desc origin

EVENT_TYPE = "INTERFACE_CHANGE"/"PIPE_EVENT"/"ATTR_CONF_EVENT"/"CHANGE_EVENT"/"PERIODIC_EVENT"/"ARCHIVE_EVENT"/"USER_EVE

EVENT_CHANNEL = channel

HEARTBEAT_CHANNEL = channel

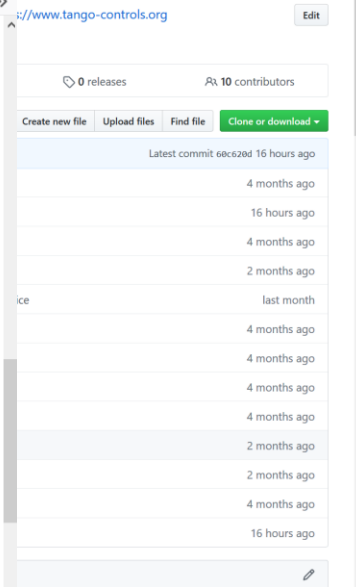
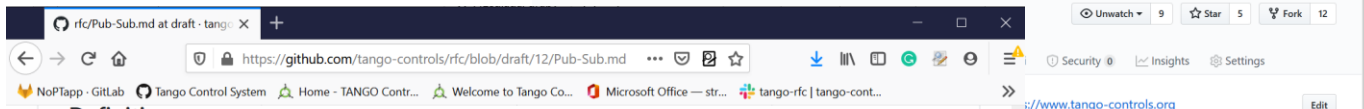
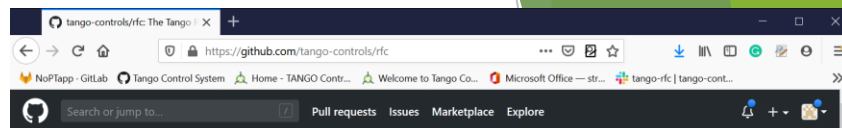
channel = string ; implementation specific
```

NOTE: In Tango V9 EVENT\_DATA MAY include source idl version, event type

## Runtime requirements

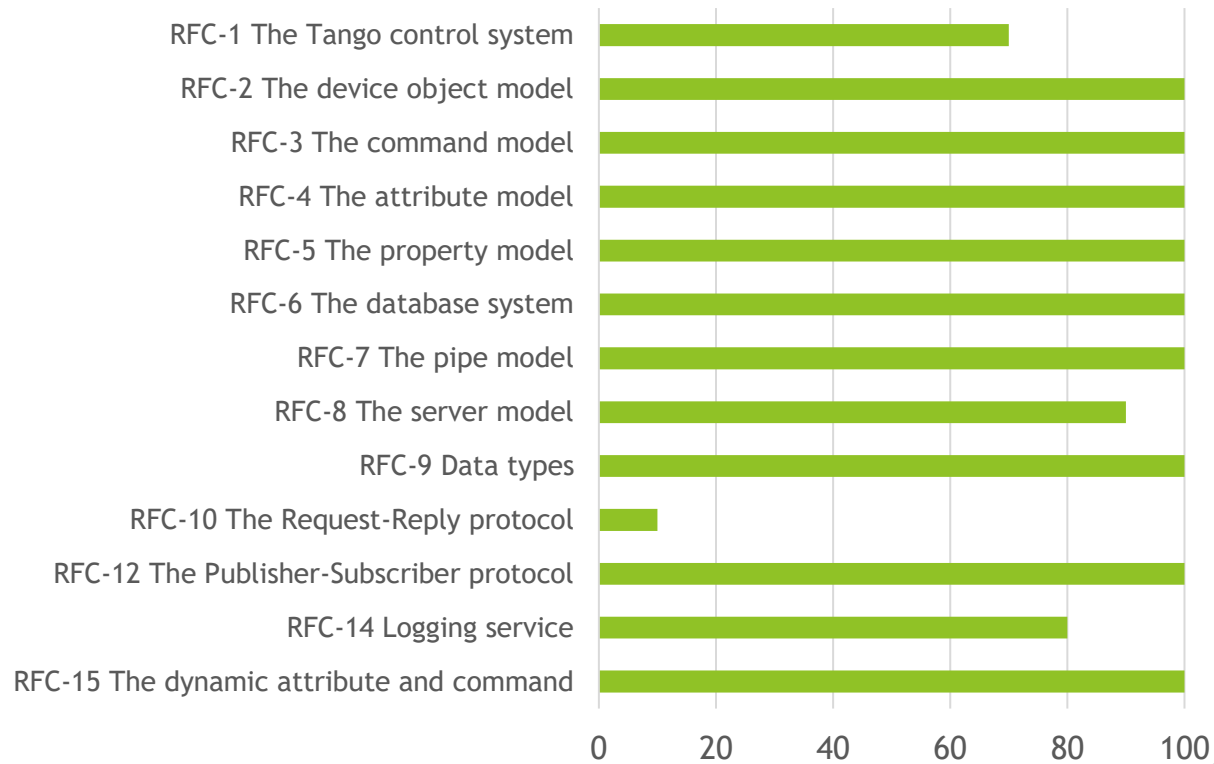
Client and server are up and running. Server is reachable from client i.e. may communicate using Request-Reply protocol [RFC-10].

<https://github.com/tango-controls/rfc>



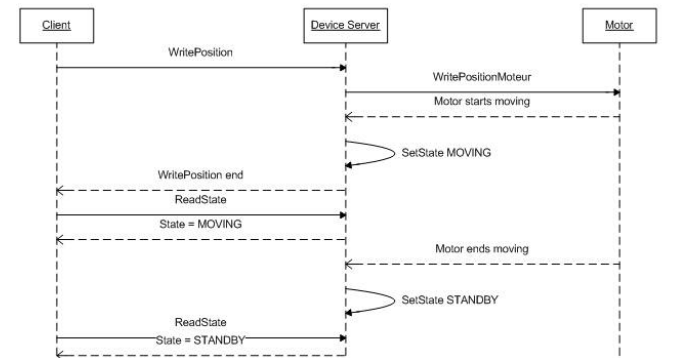
# The current position(status)

(readiness for a new prototype implementation)



# Tango RFC C++ prototype

- ▶ Goal is to use the RFC and change CORBA
  - ▶ Easier to read the RFC than read the code
- ▶ Work In Progress with gRPC
  - ▶ RFCs help to separate implementation details from the concept
  - ▶ Definition of RFC 10 Request-Reply in parallel
  - ▶ Keep the new Feature for later (Auth, Encryption, ...)



Keeping the Tango contract between Client and Server

# Testimonials

From Wilmer, computer science student @MAX IV, C++ gRPC proto



Wilmer Nilsson 10:23

Lets take the RFC-3 on commands, for example. The Goals section gives me a good understanding of what a command \_\_is\_\_. Although I can't be sure that is how it is in Tango 9, it gives me a good overview of what I can remove from Tango 9 in contrast to what I should keep or refine.

<https://github.com/tango-controls/rfc/blob/draft/3/Command.md>

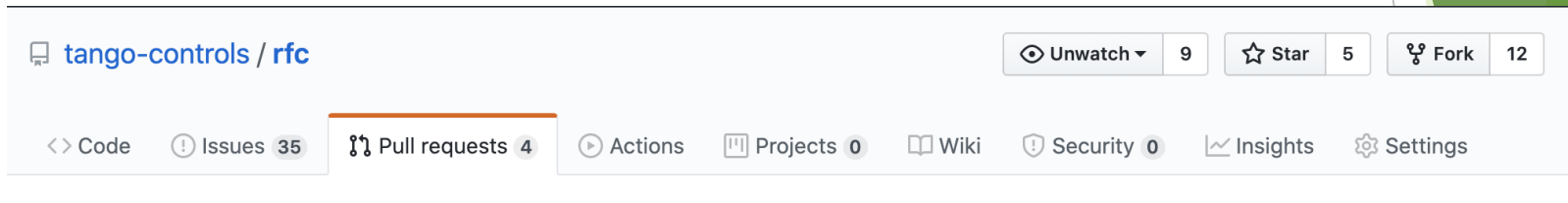


**tango-controls/rfc**

The Tango RFC project aims at define the Tango Controls kernel specification. - tango-controls/rfc

github.com

# Byproduct when defining RFC



- ▶ Group of contributors: More people knows about the core
- ▶ Integrate new core developer
- ▶ Same vocabulary:
  - ▶ i.e Admin device, DServer, DeviceServe
- ▶ Discuss new feature, breaking compatibility, improvement on the concept level:
  - ▶ Simplify types
  - ▶ Service using the underline protocol: integration in container orchestration
  - ▶ Load balancer

## Next waypoints

- ▶ Complete the core RFCs,
- ▶ Review of the specification by Tango Controls Gurus,
- ▶ Using the specification when implementing new features or bug fixing,
- ▶ Tango v9 implementation in new languages?
- ▶ A prototype implementation (heading the Tango v10 )
  - ▶ Keeping Tango Controls model described in the RFCs
  - ▶ Transport protocol not-necessary compatible with Tango v9



# Tango v9, v10, v11

- ▶ Tango 10:
  - ▶ New implementation of Tango 9 model,
  - ▶ New transport protocol,
  - ▶ Compatible with Tango 9 on concepts level,
  - ▶ Will need a bridge to work with Tango 9,
  - ▶ Tango 9 set of features,
- ▶ Tango 11:
  - ▶ Tango 10 extended with new features,

Tango v10 vs. v9:

- same concepts
- new implementation





## Tango v11 vs. v10:

- Same concepts,
- New features



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## Thank You!

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