



TANGO Device Server

Tune measurement
User's Guide

TuneMeasurementBPM Class

Revision: release_1_0_1 - Author: nleclercq
Implemented in C++ - CVS repository: tango-ds

Introduction:

Tune measurement using a dedicated BPM. This device computes tune measurement by getting its data from a BPM attribute, computing a Fast Fourier Transform (FFT) on it with possible averaging, and extracting the maximal value of this FFT inside a predefined interval.

Class Inheritance:

- Tango::Device_4Impl
  - TuneMeasurementBPM

Properties:

Device Properties		
Property name	**Property type**	**Description**
BPMDevice	Tango::DEV_STRING	The name of the dedicated BPM device server
BPMPosVectorAttributeName	Tango::DEV_STRING	The name of the BPM attribute on which the tune measure is done. Should be something like XPosVector or ZPosVector
BPMNumSamplesAttributeName	Tango::DEV_STRING	The name of the Attribute corresponding to the number of samples contained in a BPM position vector.
SkippedFirstSamples	Tango::DEV_USHORT	The number of samples that are dropped in the beginning of the BPM buffer, before computing the FFT
WindowType	Tango::DEV_STRING	The type of window applied to the input signal. Must be one of the following : RECTANGULAR, BLACKMAN, EXACT_BLACKMAN, HAMMING, HANN, FLATTOP, BLACKMAN_HARRIS_3, BLACKMAN_HARRIS_4, BLACKMAN_HARRIS_7, LOW_SIDELOBE
FFTMinimalNbPoints	Tango::DEV_LONG	The minimal number of bins in the FFT. Must be a power of 2 (otherwise, rounded to the next power of 2
ComputationPeriod	Tango::DEV_LONG	The initial internal period in millisecond at which new tune measures are produced. At each period, a new data buffer is read from the associated BPM and a new tune measure is produced.
AutoStart	Tango::DEV_BOOLEAN	if set to ’true’, the computation of the tune measure starts automatically when the device is launched
FFTWindowSize	Tango::DEV_LONG	The number of points in the BPM buffer that are used to compute the FFT
WriteNumSamplesAtStartup	Tango::DEV_BOOLEAN	When used on top of the Tranverse Feedback system, the device does not try to write the data buffer size at startup. In this case it just read the buffer size on the specified device.

Device Properties Default Values:

Property Name	Default Values
BPMDevice	No default value
BPMPosVectorAttributeName	No default value
BPMNumSamplesAttributeName	NumSamples
SkippedFirstSamples	0
WindowType	HANN
FFTMinimalNbPoints	1024
ComputationPeriod	500
AutoStart	false
FFTWindowSize	No default value
WriteNumSamplesAtStartup	FALSE

There is no Class properties.

States:

States	
Names	**Descriptions**
FAULT	An error occured either during initialization, connection to the BPM device or tune measurement itself
RUNNING	The device is currently computing the tune measure. Depending on the averaging configurations, output data may not be available yet (for example just after an initialization phase). Users should wait that the first averaged result be available.
STANDBY	The computation of the tune measure is stopped

Attributes:

Scalar Attributes			
Attribute name	**Data Type**	**R/W Type**	**Expert**
NuPeakSearchStart: the beginning value for searching the peak value in the FFT that corresponds to the tune measure	DEV_DOUBLE	READ_WRITE	No
NuPeakSearchEnd: the end value for searching the peak value in the FFT that corresponds to the tune measure	DEV_DOUBLE	READ_WRITE	No
Nu	DEV_DOUBLE	READ	No
NuInHigherInterval: sets the interval of the Nu attribute : if false Nu will be in [0, 0.5], if true Nu will be in [0.5, 1].	DEV_BOOLEAN	READ_WRITE	No
NuRaw: the reduced frequency of the FFT maximum searched in the interval [0, 0.5]	DEV_DOUBLE	READ	No
FFTNbPoints	DEV_LONG	READ	No
SkippedFirstSamples: the number of samples that are dropped in the beginning of the BPM buffer, before computing the FFT	DEV_USHORT	READ_WRITE	No
FFTAveraging: the number of successive FFT taken to compute the averaged FFT	DEV_USHORT	READ_WRITE	No
EstimComputTime: the estimated time needed to get data from the BPM and compute a new FFT	DEV_LONG	READ	No
ComputationPeriod: The internal period in millisecond at which new tune measures are produced. At each period, a new data buffer is read from the associated BPM and a new tune measure is produced.	DEV_LONG	READ_WRITE	No
FFTWindowSize: the number of points in the BPM buffer that are used to compute the FFT	DEV_LONG	READ_WRITE	No

Spectrum Attributes			
Attribute name	**Data Type**	**X Data Length**	**Expert**
FFTabs: the abscissa axis of the FFTord attribute	DEV_DOUBLE	131072	No
FFTord: the RMS power spectrum on which nu is searched	DEV_DOUBLE	131072	No

Commands:

More Details on commands....

Device Commands for Operator Level		
Command name	**Argument In**	**Argument Out**
Init	DEV_VOID	DEV_VOID
State	DEV_VOID	DEV_STATE
Status	DEV_VOID	CONST_DEV_STRING
Start	DEV_VOID	DEV_VOID
Stop	DEV_VOID	DEV_VOID

1 - Init

- **Description:** This commands re-initialise a device keeping the same network connection.
  After an Init command executed on a device, it is not necessary for client to re-connect to the device.
  This command first calls the device *delete_device()* method and then execute its *init_device()* method.
  For C++ device server, all the memory allocated in the *nit_device()* method must be freed in the *delete_device()* method.
  The language device desctructor automatically calls the *delete_device()* method.

- **Argin:**
  DEV_VOID : none.

- **Argout:**
  DEV_VOID : none.

- **Command allowed for:**
  - Tango::FAULT
  - Tango::RUNNING
  - Tango::STANDBY

2 - State

- **Description:** This command gets the device state (stored in its *device_state* data member) and returns it to the caller.

- **Argin:**
  DEV_VOID : none.

- **Argout:**
  DEV_STATE : State Code

- **Command allowed for:**
  - Tango::FAULT
  - Tango::RUNNING

- Tango::STANDBY

3 - Status

- **Description:** This command gets the device status (stored in its *device_status* data member) and returns it to the caller.

- **Argin:**
  DEV_VOID : none.

- **Argout:**
  CONST_DEV_STRING : Status description

- **Command allowed for:**
  - Tango::FAULT
  - Tango::RUNNING
  - Tango::STANDBY

4 - Start

- **Description:** Start the computation of the tune measure

- **Argin:**
  DEV_VOID :

- **Argout:**
  DEV_VOID :

- **Command allowed for:**
  - Tango::STANDBY

5 - Stop

- **Description:** Stops the computation of the tune measure

- **Argin:**
  DEV_VOID :

- **Argout:**
  DEV_VOID :

- **Command allowed for:**
  - Tango::FAULT
  - Tango::RUNNING

TANGO is an open source project hosted by : 	Core and Tools : CVS repository on tango-cs project Device Servers : CVS repository on tango-ds project