

In exercise of the powers conferred under clause (o) of sub-section 2 of Section 5 of the Pakistan Telecommunication (Re-organization) Act, 1996 (Act XVII of 1996), the Pakistan Telecommunication Authority is pleased to make the following Regulations:

PART - I

PRELIMINARY

1. Short title and commencement. (1) These Regulations shall be called '*Clock Synchronization Regulations 2010*'

(2) These Regulations shall come into force from the date of gazette notification

2. Definitions. (1) In these Regulations, unless there is anything repugnant in the subject or context: -

(a) "**Act**" means Pakistan Telecommunication (Re-organization) Act, 1996 (XVII of 1996);

(b) "**Authority**" means Pakistan Telecommunication Authority established under section 3 of the Pakistan Telecommunication (Re-organization) Act, 1996 (Act XVII of 1996) ;

(c) "**CDR**" Means Call data Record;

(d) "**GPS**" Means Global Positioning System;

(e) "**ITU-T G.811**" Means ITU-T Recommendation on "Timing Characteristics of Primary Reference Clock".

(f) "**ITU-T G.812**" Means ITU-T Recommendation on "Timing requirements of slave clocks suitable for use as node clocks in synchronization networks"

(g) "**LDI Licensee**" Means Long distance International licensee licensed under the Act to establish, maintain and operate a public fixed switched network for the provision of nation-wide long distance and international telephony service.

(h) "**M&RITT**" Means Monitoring and Reconciliation of International telephony traffic;

(i) "**NTP**" Means Network Time Protocol;

(j) "**Regulation**" means all regulations issued by the Authority including without limitation, these regulations;

(k) "**PRC**" Means Primary Reference Clock ;

(l) "**Stratum**" Means the level of hierarchy using semi-layered system of clock sources.

(m) **“Stratum-0”** Means the devices such as atomic (cesium, rubidium) clocks, GPS clocks or other radio clocks used for clock synchronization.

(n) **“Stratum-1”** Means the computers attached to Stratum 0 devices acting servers for timing requests from Stratum 2 servers via NTP.

(o) **“SSU”** Means Synchronization supply unit;

(p) **‘Rules’** means all rules issued by the Authority pursuant to section 57 of the Act;

(q) **“UTC”** Means Coordinated Universal Time , a standard based on International atomic time ;

(2) Words and expressions used herein but not defined shall have the same meaning assigned to them in the Act, Rules, and Regulations.

3. Scope and Applicability.- These regulations shall apply to all LDI/LL/Cellular mobile/CVAL Data licensee for the purpose of synchronization of their system clock, to ensure fair reconciliation of CDR/IPDRs in line with the criterion/ratings determined by the Authority from time to time. It has two parts, one relates to synchronizing of the system clock for error free data recovery while the other part ensures that the date and time stamps are accurate for billing reconciliation purpose.

PART - II

FACTORS TO BE ADOPTED FOR NETWORK CLOCK SYNCHRONIZATION

4. Clock Accuracy Requirement.-

There are two common methods of clock recovery. One based on independent highly accurate clock (atomic clock) while the other is based on a clock recovered through ‘Network Time Protocol’ servers remotely. All licensees shall ensure the adoption of the following requirement for their Reference clock:

i. Primary Reference Clock (PRC)

As Per ITU-T G.811 Recommendation, the long term accuracy of PRC (Primary reference clock) should be maintained at 1 part in 10^{11} (1×10^{-11}) with verification to Coordinated Universal Time (UTC). A PRC may be realized as an autonomous clock, operating independently of other sources that provide the reference synchronization signal to all other clocks within a network.

a. Synchronization Supply Unit (SSU)

Wherever required SSU shall be deployed to ensure reliable synchronization distribution. It is a logical function for frequency referencing, processing and

distribution having the frequency characteristics as per ITU-T G.812 Recommendation.

ii. **Synchronization using NTP**

Clock of the telecom networks can also be synchronized using NTP servers. Strata refer to the hierarchical levels used by NTP to disseminate time information over a network. Networks synchronized using NTP servers shall have a stratum level which is one level higher than the reference clock. Each higher level of stratum (providing relatively lesser accuracy) provides a delay of 10-100 milli second. All NTP secondary servers must be fully NTPv4 compliant.

5. Submission of Information - (1) All LL/LDI/CMTOs licensees shall compile and submit information regarding

- a) Clock Synchronization source
- b) Degree of Accuracy
- c) Stratum level in case synchronized using NTP servers

PART - III

DATE AND TIME STAMP FOR CDR/IPDR SYNCHRONIZATION

6. Licensee shall ensure that:

- (i) Date and time stamp clocks used for CDR/IPDR generation should be accurate up to 100msec.
- (ii) Synchronize their date and time stamps with a standard International NTP or GPS source.
- (iii) Their system shall be re-synchronized at least once a week.
- (iv) The network with whom they are interfacing also conforms to all the regulations.
- (v) Their system clock shall not deviate more than one second per week.
- (vi) That unrestricted access to PTA officer designated is available during routine normal business hours.

PART- IV

GENERAL PROVISIONS

7. Reporting Requirements.-

(1) The designated PTA division shall present the test results to the Authority within a period of 30 days from completion of the 'Date and Time verification' survey process.

(2) The Authority will conduct manual test/inspections which may be replaced with an automated process subject to the availability of advanced tools.

(3) The Authority may place the relevant data for public information.

(4) On the basis of PTA findings and/ or at least 10 complaints filed to the Authority against a licensee in one month, the Authority shall initiate an investigation process through an officer nominated by the Authority.

(5) The licensee will perform such test monthly basis at their own.

- a. The Licensee shall maintain a record of their clock synchronization test for (03) years. This record shall at all times be open to inspection and audit by the Authority or representative of the Authority.