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Access Network-Rural Automatic Exchange

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Abstract:

Here we used automatic rural exchange which is used in remote areas where number of connections are less and it is difficult to provide connections individually from local exchange to them .connectivity of AN-RAX to the network. Hardware architechture of this AN-RAX and usage and working of individual cards and its advantages over ordinary rural automatic rural exchange. Main features of AN-RAX and different levels of remoting it to the local exchange. call processing in AN-RAX and how call is initiated and terminated using this in remote areas.

1.Introduction

The product AN-RAX is basically a Subscriber line concentrator, used for remoting. It has 256 ports and all are used for subscriber connections. This 256 AN –RAX is connected to main exchange using V5.2 interface. PCM'S that is just 4 pairs of wires are enough for AN-RAX. It can remotely monitor only when physical changes to be done like changing of cards we have to go to AN-RAX.

2.Connectivity To Network

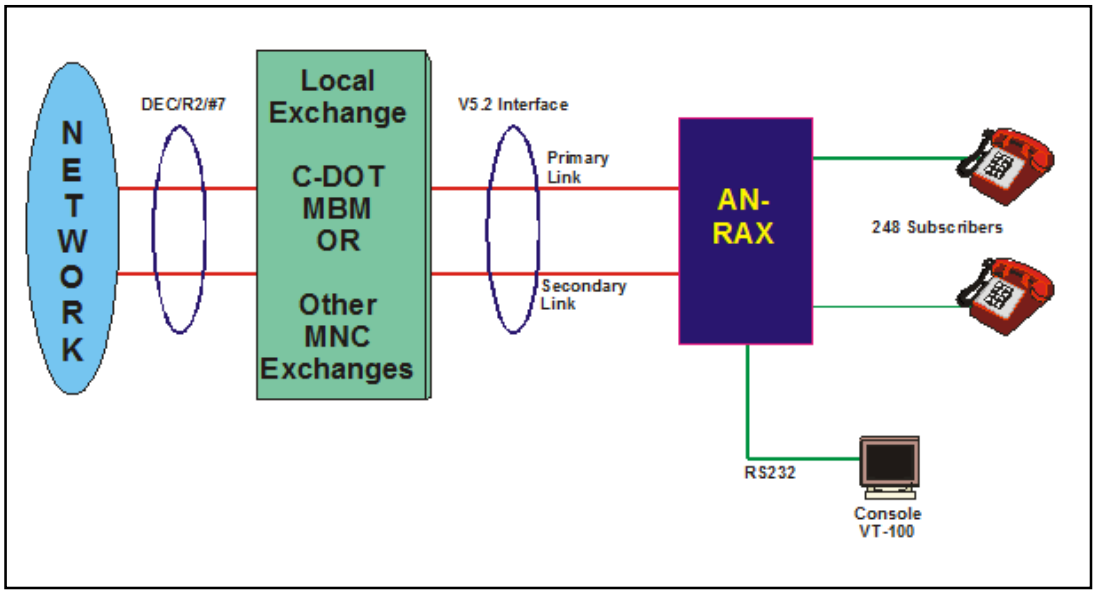

Figure 1

2.1.Main Features

The main feature of AN-RAX is that it provides concentration, through V 5.2 protocol, which is used as a signalling protocol between LE and AN-RAX. 248 PSTN subscribers can be supported on two E1 links towards LE, thus providing an approximate concentration of 4:1. This places the AN-RAX at a level higher than a simple MUX, which is used at third level of remoting.Thesystem canwork on one E1 link towards LE without PROTECTION', resulting in increase in concentration to 8:1.

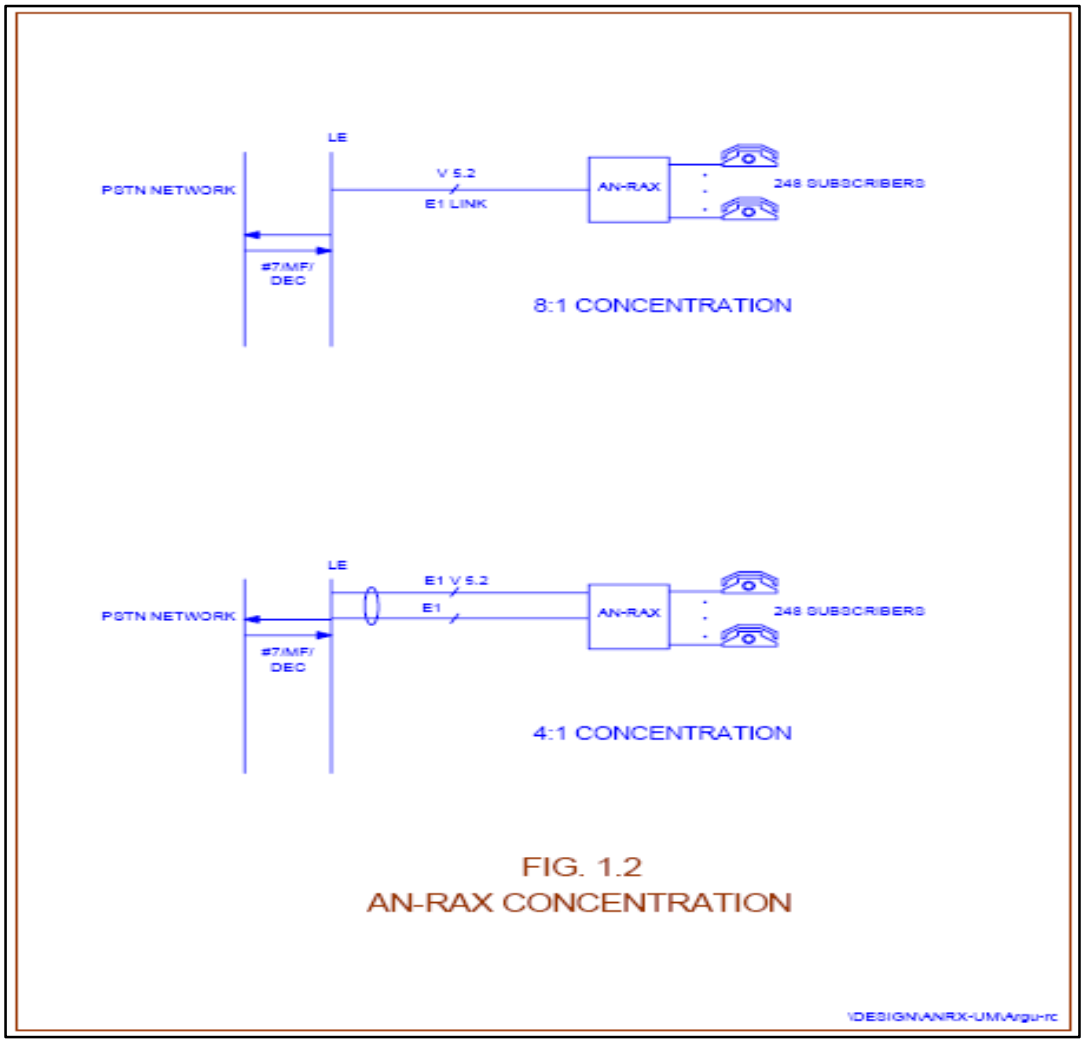

Figure 2

2.2.Levels Of Remoting

There are three level of remoting, namely the first, second and third level, from the 'Local Exchange' (LE).

- The 'Remote Switch Unit' (RSU) provides the functionality of first level of remoting. All the Subscribers connected to RSU can access each other and also the subscribers, in the 'National Network' (NAT-NW), through LE. RSU in this case will, perform the functionality of a complete switch (with both intra exchange and upto NAT-NW Switching). It will handle the 'Call Processing' (CP), charging and billing functionality, but would itself be a part of the LE.
- The 'C-DOT Access Network - RAX ' (AN-RAX) will provide the second level of remoting. AN-RAX might be connected to a RSU or directly to the LE. The

AN-RAX supports V5.2 protocol, and handles the functionality of second level of remoting. The second level of remoting has its scope and role clearly defined. At this level there would neither be any intra switching or call processing activities, nor the AN-RAX would handle the charging, billing and administration functions of subscribers.

- Third Level of remoting handles the front end functions (subscriber events), but does not provide any concentration. The various subscriber ports of MUX have nailed up (fixed) slots in the link towards LE. The MUX may be connected directly to LE or to an unit of a higher level of remoting.

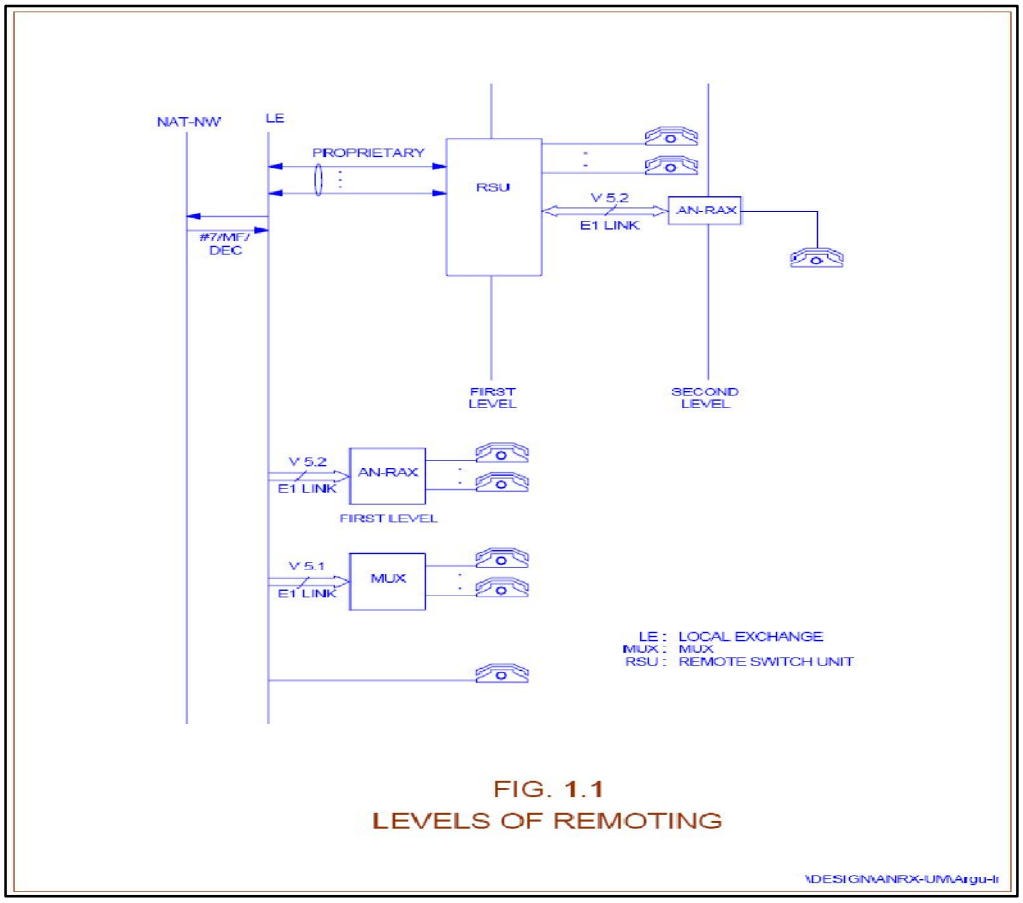

Figure 3

2.3.Hardware Architecture

The integrated circuits used in the C-DOT 256P AN-RAX hardware have low power dissipation and high operational reliability.All the system circuitry has been packaged

into seven card types. On the broad level these could be divided into following categories.

2.Terminal Interfaces

C-DOT 256P AN-RAX uses Subscriber Line Card (LCC/CCM) to provide Analog Terminal Interface. Each terminal interface card caters to 8 terminations. Four cards make a Terminal Group (TG) which is associated with PCM 32 channel link towards the ARC card. Signalling information are multiplexed and placed on 4 wire ABCD signalling bus toward SPC/ISP card.

Subscriber Line Card (LCC/CCM) :

Line Circuit Card (LCC) is used to interface ordinary subscriber lines.

The Line Circuit Card performs a set of functions collectively termed as BORSCHT, signifying:

B - Battery Feed

O - Overvoltage Protection

R - Ringing

S - Supervision

C - Coding

H - Hybrid Conversion

T - Testing.

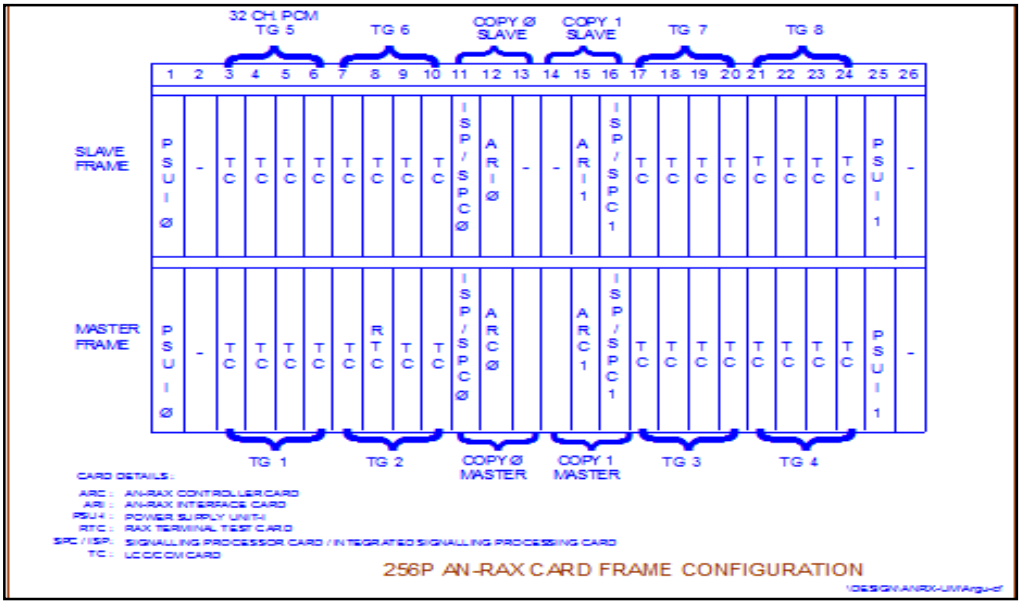

Figure 4

3.Controller Cards

3.1.AN-RAX Controller Card (ARC)

The ARC card is the main controller card which performs all administrative functions of AN-RAX. Towards the line cards, it gives card select, subscriber select, clock and sync signals. It has an interface towards SPC/ISP card providing Signalling Interface to the line cards. It has an interface towards the ARI (AN-RAX Interface Card) used in slave frame for providing voice and Signalling Interface for the line cards in the slave frame.There are two ARC cards (copy 0 & copy 1) in Master frame. ARC communicates with the duplicate ARC through HDLC link. One more HDLC link is used to communicate with the RTC cards.

3.2.AN-RAX Interface Card (ARI)

The ARI Card acts as an extension of ARC for the cards in slave unit. The copy 0 ARI card interfaces with the copy 0 ARC card and other cards in slave frame. Similarly, copy 1 ARI card interfaces with the copy 1 ARC card and other cards in slave frame. The signals between ARI card and the corresponding ARC card are exchanged through both front end cables as well as through interframe cables on the back plane.

Signalling Processor Card (SPC) / Integrated Signalling Processor Card (ISP) :

Signalling information related to terminations such as dialled digits, ring trip etc., are separated at the Terminal Interface cards and carried to the Signalling Processor (SPC/ISP) on a time multiplexed link. The SPC/ISP passes on this information to the ARC.

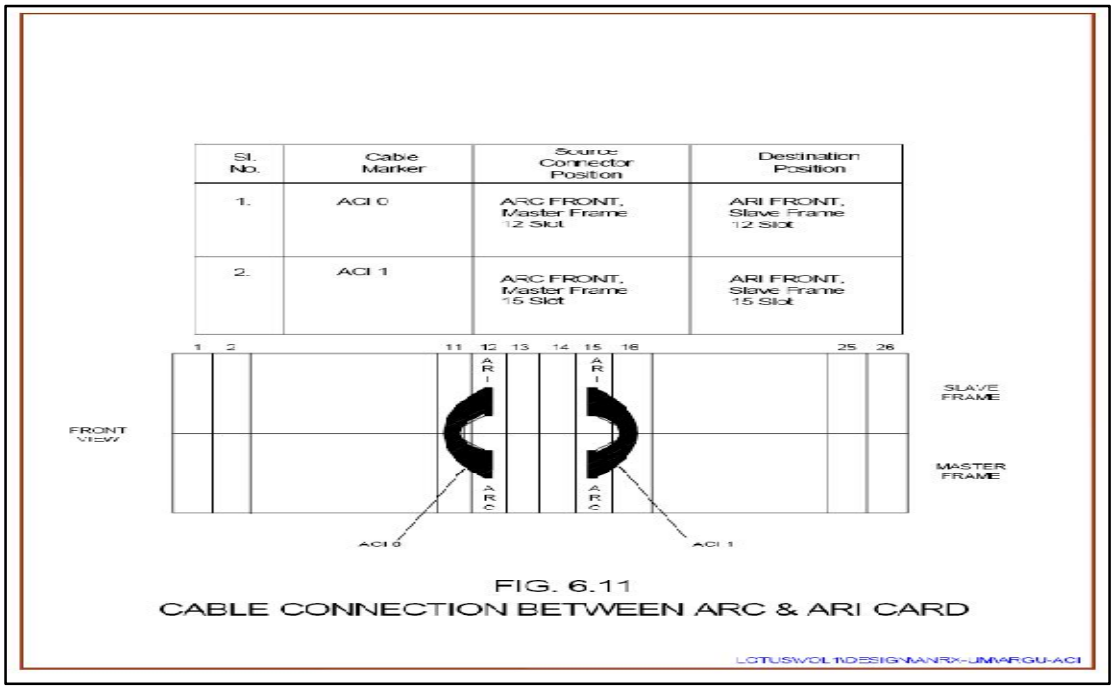

FIG. 6.11
CABLE CONNECTION BETWEEN ARC & ARI CARD

Figure 5

4.Service Cards

4.1.Rax Terminal Test Card

It is used for testing of analog subscribers.

It is present in the 8th slot of AN-RAX frames.

If RTC cards are there in AN-RAX it consumes 8 ports so we can utilise remaining 248 ports for subscribers.

4.2.Power Supply Unit

It performs mainly two functions:

Ringer for ringing for subscriber whioch require 25 hz-50v for 1 cycle.

Dc-dc conversion for converting -48 to +5v or +12 v.

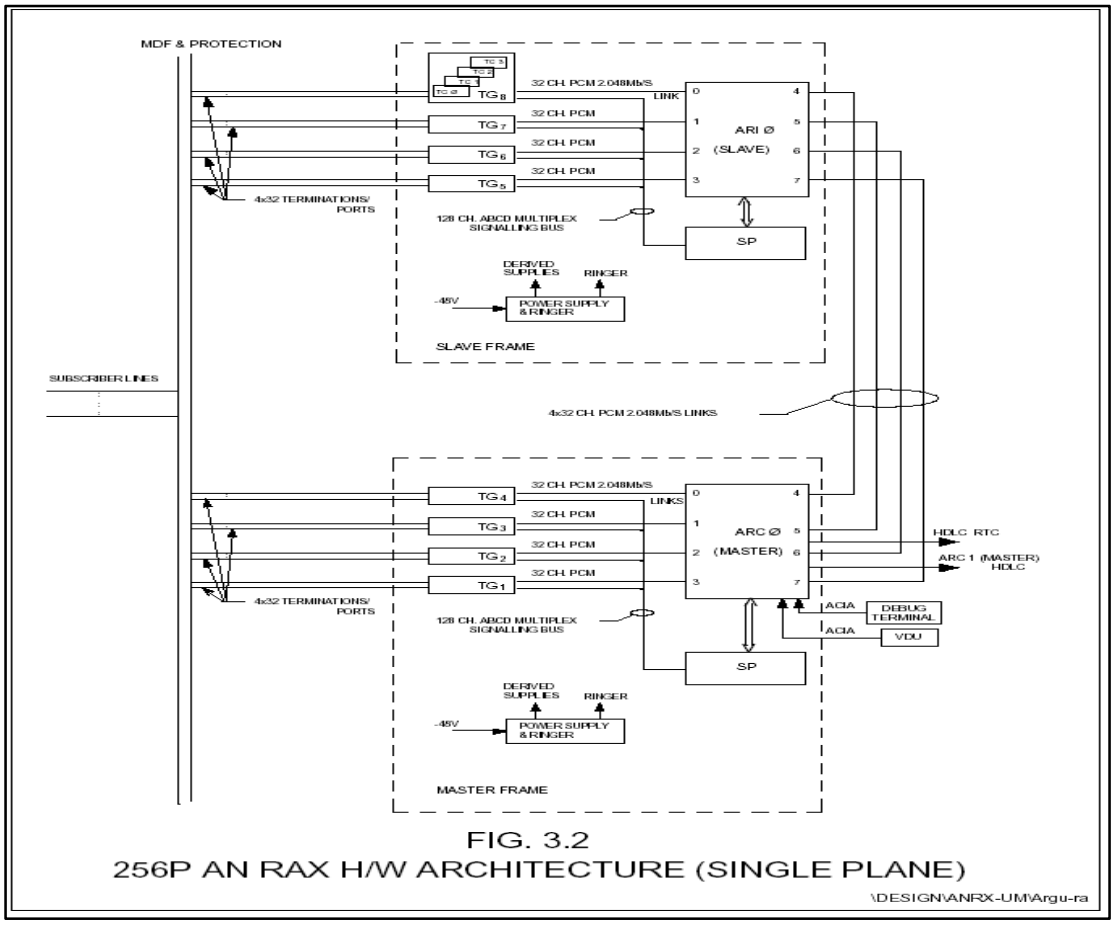

Figure 6

5.Call Processing

5.1.Call Initiated From LE

On receiving a call request from the network for a particular AN port, LE feeds call routing tone to calling subscriber and proceed to get a bearer channel for this call by sending an ALLOCATION message to AN and starts a timer. After getting on ALLOCATION COMPLETE message from AN, LE sends on ESTABLISH message to AN with cadenced ringing parameter to connect the ring to user port and starts a timer. AN sends ESTABLISH ACK message and call enter into ringing phase. In case AN subscriber has caller-id feature in which directory number of calling subscriber is to be sent to user's equipment. LE shall send ESTABLISH message to AN without cadenced ringing parameter. LE shall send the digits in-band and thereafter send a SIGNAL message with Cadenced Ringing to AN to connect ring to user port.

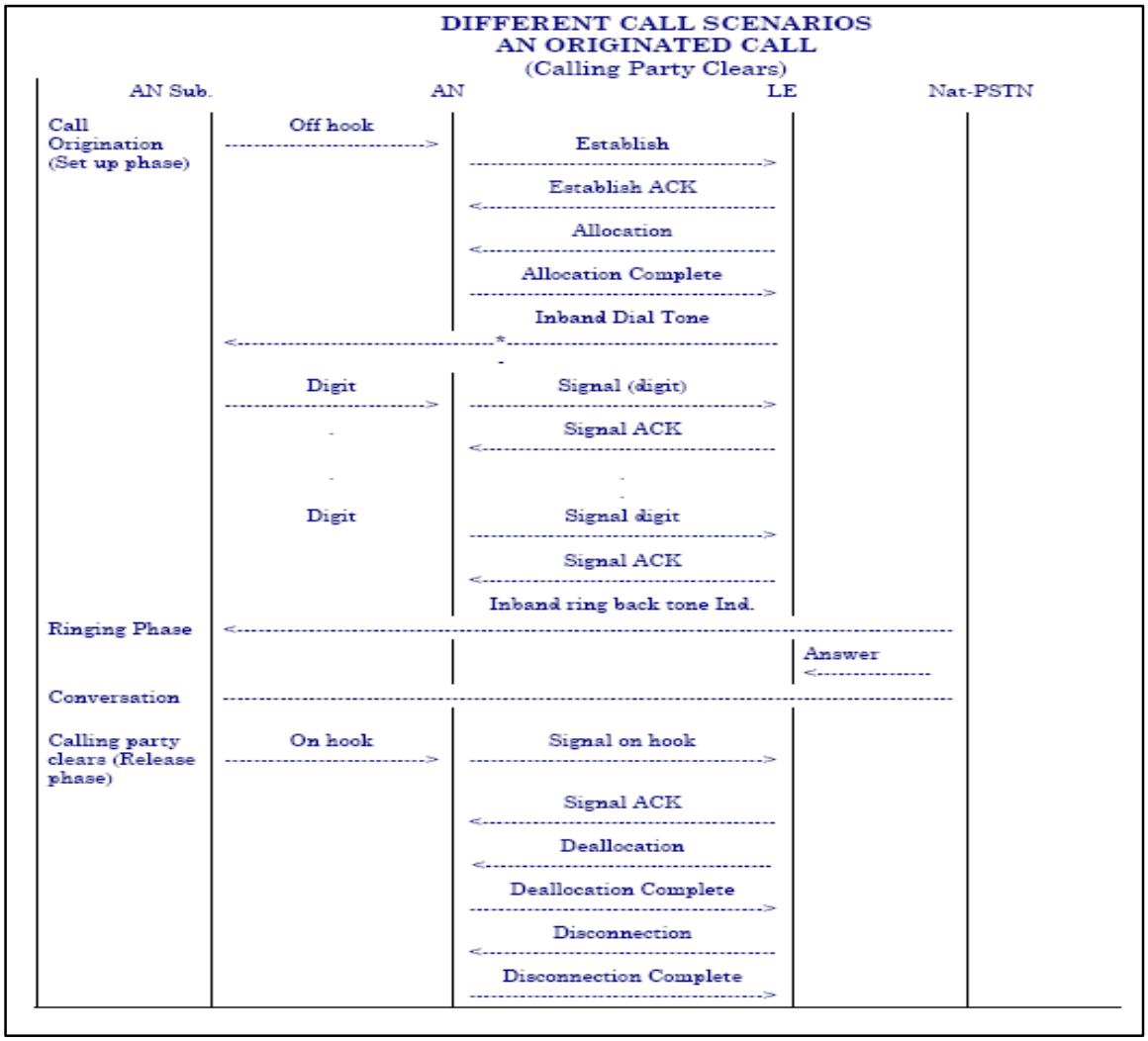

Figure 7

Call enters into conversation phase when answer is received from the AN subscriber, answer should be communicated across V5 interface by sending SIGNAL(Off Hook) message to the other end. Various subscriber features can be initiated by subscriber by doing hook switch Flash when the call is in conversation phase. If the release of the call is initiated from LE, parking tone should be fed to ANsubscriber, parking tone timer shall be runat LE and disconnection from AN subscriber be awaited. AN subscriber disconnects before the expiry of parking tone timer, this indication comes in the form of SIGNAL (On Hook) message across V5 interface. Call clearing is started by sending DEALLOCATION message and on getting DEALLOCATION COMPLETE, PSTN protocol is cleared by DISCONNECTION/DISCONNECTION COMPLETE message.

5.2.Call Initiated From AN

AN on detecting an origination from user port should send ESTABLISH message to LE. LE shall send ESTABLISH ACK message in response, gets a bearer channel by ALLOCATION/ALLOCATION COMPLETE and connect dial tone to the channel.When answer is received from PSTN subscriber, call will enter into conversation phase. For AN originated calls from subscribers with home metering facility, metering pulses shall be reported to AN in the form of SIGNAL (Meter Pulse) message over the V5 interface.

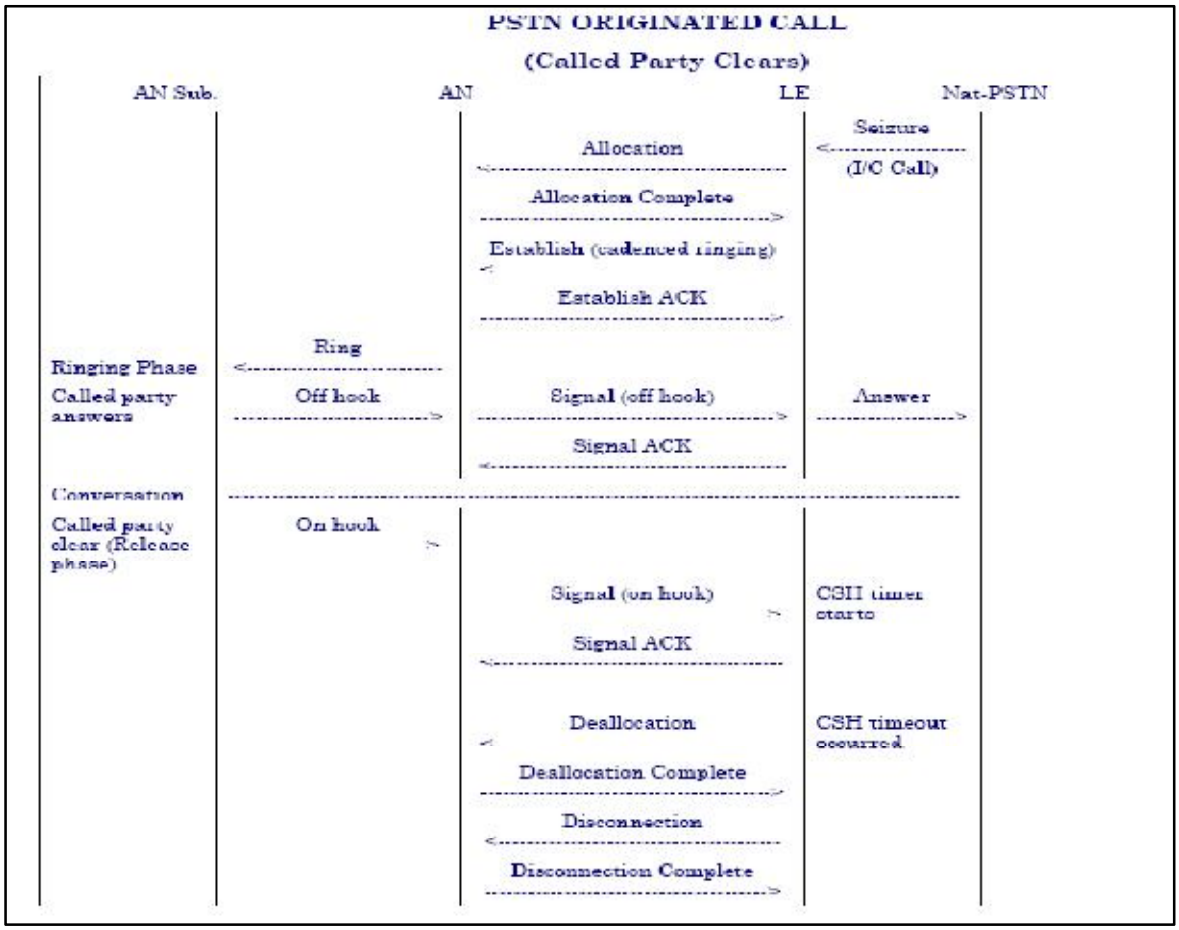

Figure 8

6.Conclusion

Thus by using this AN-RAX we can reduce the number of connectors from the local exchange to the remote areas which have less number of connections .It is more concentrated than ordinary RAX and have double the concentration that have.It can

provide all the 256 ports to the 256 connections with just 2 E1 links.It also have the advantage of working in non air –conditioned places also so it is best suited in rural areas.

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