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Conversion and Installation Procedure of 256p Rax to Anrax

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Abstract: ***The present manuscript deals with the conversion of 256P RAX to AN-RAX and also the installation procedure of 256P RAX to AN-RAX. The 256P RAX uses only 184 lines PSTN subscribers but if we convert it into ANRAX it uses 248 lines PSTN subscribers through V5.2 protocol. The 256P RAX consists of three racks, they are: 1) Power Distribution Panel (PDP), 2)Master Frame & 3)Slave Frame. After the conversion of 256P RAX to AN-RAX we can use the master frame as slave frame and slave frame as master frame, both will be same after the conversion. To do the conversion of 256P RAX some of the cards become redundant and those cards have to be removed. Then the modification will be done for the 256P RAX. The conversion and installation procedure is completely done in five steps. The main objective for converting the 256P RAX we can have the maximum lines for the exchange.***

Key Words: 256p Rax, Access Network Rural Automatic Exchange (An-Rax), Public Switching Telephone Network (Pstn), V5.2 Protocol Standard Interface Between Le And An, Local Exchange (Le), An-Rax Controller Card (Arc), An-Rax Interface Card (Ari).

I. INTRODUCTION

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 Local Exchange (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.

AN-RAX provides a transparent link between subscriber and LE. It handles the various subscriber events, the BORSCHT (Battery feed, Over voltage protection, Ringing, Supervision, Coding, Hybrid and Testing) functionalities.

All the administration, call processing, charging, billing, traffic monitoring and switching are performed at LE, where AN-RAX plays the role of front end termination at remote end.

The main feature of AN-RAX is that it provides concentration through V 5.2 protocol, which is used as a signaling protocol between LE and AN-RAX. 248 PSTN subscribers can be supported on two E1 links towards LE. This places the AN-RAXat a level higher than a simple MUX, which is used at third level of remoting. The system can work on one E1 link towards LE.The levels of remoting are shown in the **Figure 1.**

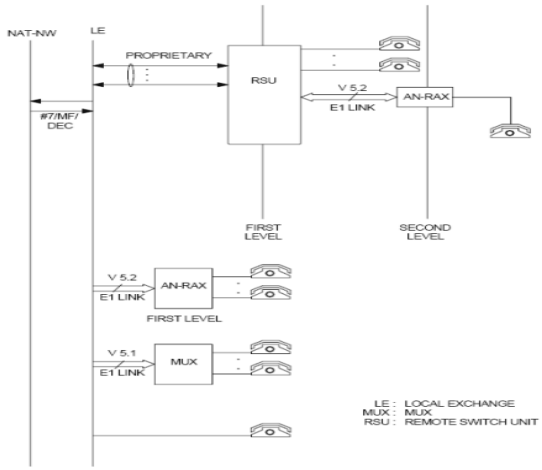

FIG. 1
LEVELS OF REMOTING

II. EXISTING 256P RAX CONFIGURATION

The list of cards which become redundant and have to be removed are given in the table below.

Card name	Slot
RAT	M9,M18
RMF	M10,M17
CNF(if present)	M7
RSC	M12,M15,S12,S15
RAP	M13,M14
RDS	M21,S21
RDC	M24,S24
RWC	S10,S17
TWT	Wherever present
EMF	-do-
RDT	-do-

The maintenance panel is also to be removed.

The list of cables which have to be completely removed from the system is given below:-

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Sl. No.	Cable marker no.	Signal type name	Source placement frame/connector position.	Destination Placement frame/ connector position
1	A800	E&M	Master frame3A (if present)	MDF
2	A801	E&M	Master frame4A (if present)	MDF
3	A802	E&M	Master frame5A (if present)	MDF
4	A803	E&M	Master frame6A (if present)	MDF
5	A804	E&M	Slave frame3A (if present)	MDF
6	A805	E&M	Slave frame4A (if present)	MDF
7	A806	E&M	Slave frame5A (if present)	MDF
8	A807	E&M	Slave frame6A (if present)	MDF
9	DT01	RDS-RDC(Pair) Cable	Master frame21A (if present)	DDF
10	MP00	MPACIA link	Master frame2A POS1	MP
11	PRD1	-48V supply	PDT	MP
12	DT02	RWC cable	Slave frame 10A,S17A (if present)	DDF
13	DTNS	RNS trunk cable	RNS(if present)	MDF
14	CLC0 CLK0 SYN0	Clock & Sync. Output for copy0	RNS(if present)	RAP0 Slot 13 A3 & 13 B3
15	CLC1 CLK1 SYN1	Clock & Sync. Output for copy1.	RNS(if present)	RAP1 Slot 14 A3 & 14 B3

III. MODIFICATION TO BE DONE ON MOTHERBOARD

A. Straps On Motherboard

The motherboard of 256P RAX has to be modified to enable installation of AN-RAX.

The master frame will have 20 straps. The list of straps is given in table. The shrouds of slots 12A & 15A will have to be removed for new straps.

The slave frame needs to have only four of the straps mentioned in the table, but all the 20 straps may be done in slave frame to provide inter changeability in future without major effort. The four straps are Sl.No. 17,18,19& 20 of straps list table.

STRAPS LIST FOR AN-RAX

Sl.No.	Slot.No.From	Pin No. To.
1	12/Ba8	15/Bc8
2	12/Bc8	15/Ba8
3	12/Ba9	15/Bc9
4	12/Bc9	15/Ba9
5	12/Aa9	15/Ac9
6	12/Ac9	15/Aa9
7	12/Ba2	15/Ba2
8	12/Bc2	15/Bc2
9	12/Ba3	15/Ba3
10	12/Bc3	15/Bc3
11	12/Ba4	15/Ba4
12	12/Bc4	15/Bc4
13	12/Ba5	15/Ba5
14	12/Bc5	15/Bc5
15	12/Ba23	15/Ba23
16	12/Bc23	15/Bc23
17	11/Ac6	16/Bc1
18	11/Ac7	16/Ac9
19	16/Ac6	11/Bc1
20	16/Ac7	11/Ac9

B. Placement Of Precharge Pins

The precharge pins and back panel grounding nuts have to be provisioned in the motherboard so that they make early contact with ARC/ARI cards as they are jacked in.

Two precharge pins have to be placed in each of the slots 12 & 15. These should replace the screws of the slot.

Back panel grounding nuts have to be provisioned on the motherboard for SPC/ISP card slots 11 & 16.

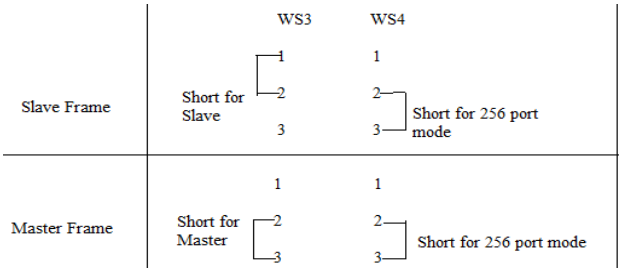
C. Placement of New Shrouds

Two shrouds have to be placed on the motherboard at location 12B & 15B in master frame only. However for inter changeability in the future this can be done on slave frame also.

D. Jumper Setting On Motherboard For Configuring Motherboard For Master/Slave and 128/256 Port Mode

There are two set of 3pin berg stick (Jumper pins) WS3 & WS4 on the back side of 256P RAX motherboard as shown in **figure 2**. Each motherboard of 256P RAX can be configured for Master/Slave and 128/256 port mode by shorting these pin using shorting stubs.

(a) Jumper setting on each motherboard for 256 port mode is to be done as shown below.



As seen from the back side (solder side of motherboard).

(b) For 128 port mode, jumper setting is to be done as shown

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below.

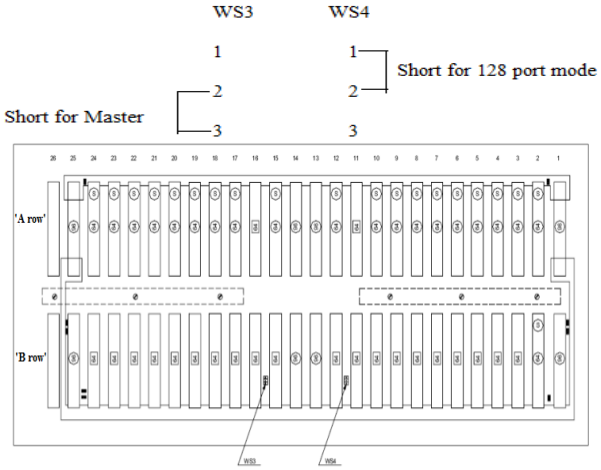

FIG. 2
JUMPER SETTING PINS ON MOTHER BOARD

IV. PLACEMENT OF CABLES ON MOTHERBOARD

A. Back Plane Interframe Cables

The five interframe cables are to be connected between Master and Slave frames.

S.N.	Cable Marker No.	Source Placement Connector Position	Destination Placement Connector Position	Cable Description.
1	IFC0	Master frame 12A, Pos II	Slave frame 12A, Pos II	2×7 Flat cable connector
2	IFC1	Master frame 12A, Pos I	Slave frame 12A, Pos I	-do-
3	IFC2	Master frame 15A, Pos II	Slave frame 15A, Pos II	-do-
4	IFC3	Master frame 15A, Pos I	Slave frame 15A, Pos I	-do-
5	IFC4	Master frame 2B, Pos I	Slave frame 2B, Pos I	-do-

The connection details are shown in **fig 3.**

B. Digital Link Cable

Digital link cable terminates two E1 links on the ARC card in one of the copies of Master frame. The other end of the cable is terminated on the DDF (Digital Distribution Frame).

The details of the cable is given in table below.

The connection details are shown in **figure 4.**

Cable Marker	Source Connector Position	Type	Destination Position	Type
DTC1	Master frame 12B Pos-I or Master frame 15B Pos-I	7×2 single module connector	Digital Distribution Frame	Bare Wire

C. Dumb Terminal Cable

The dumb terminal cable is terminated on ARC card in slot 13B & 2A in Master frame.

The details of cable is given in the table below.

Cable Marker No.	Source Connector Position	Type	Destination Connector Position	Type
SDT0	Master frame 2A Pos-I & 12B Pos-III	7×2 Single Module Cable	Dumb Terminal RS232-C connector	25-Pin D-type connector

The cable details and connector position on Master frame are shown in **figure 5.**

NOTE: Before switching on the dumb terminal, it should be well checked that the earthing of the AC main supply and AN-RAX have been properly done.

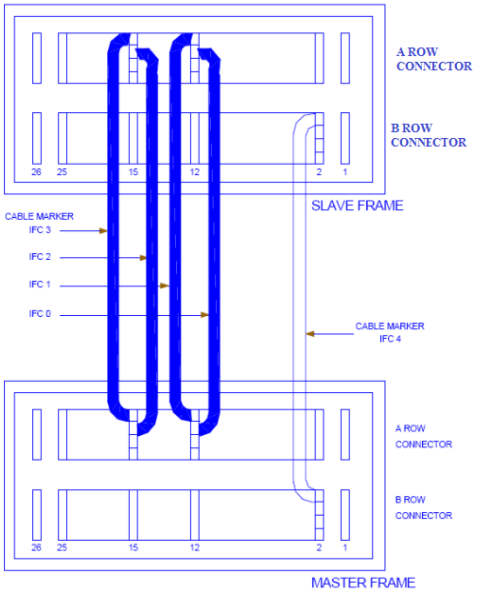

FIG. 3
INTER FRAME CABLE TERMINATION

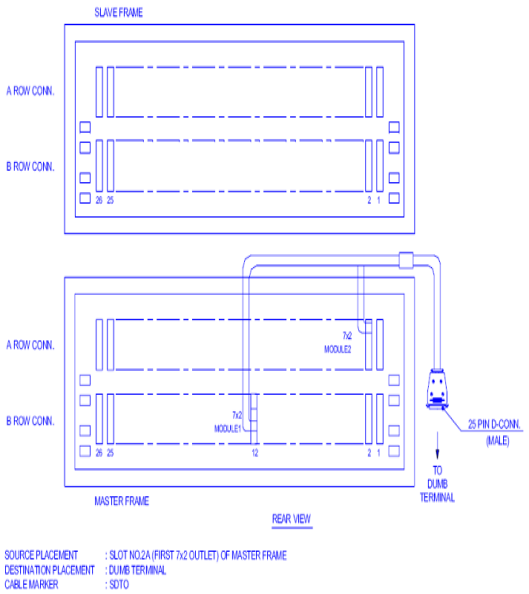

FIG. 5
DUMB TERMINAL INTERFACE CABLE

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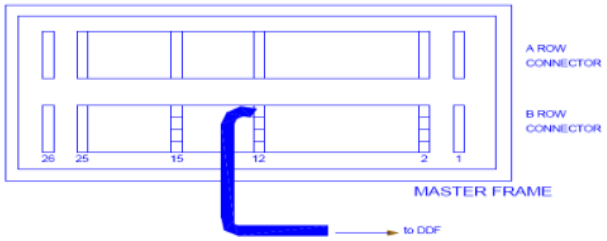

FIG. 4
DIGITAL LINK CABLE TERMINATION

V. NEW HARDWARE

A. New Cards

The new hardware card for AN-RAX are listed in the table below:-

[1] Card Name	[2] Positions
[3] AN-RAX Controller Card (ARC)	[4] M12 & M15
[5] AN-RAX Interface Card (ARI)	[6] S12 & S15

The new hardware configuration is shown in **figure 6.**

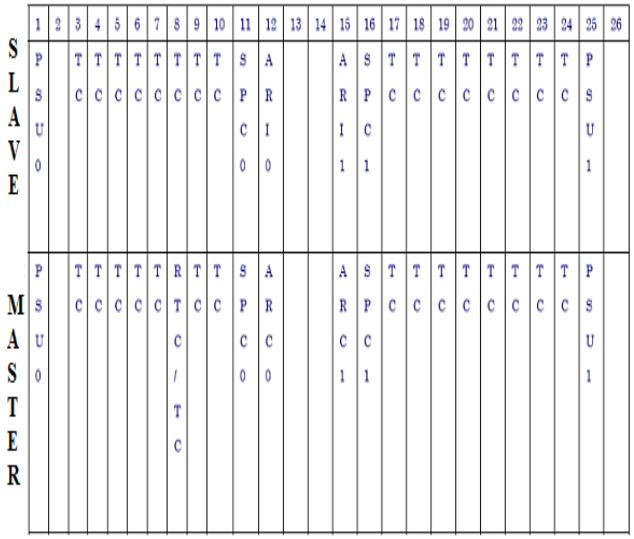

FIG.6

FIG. 6: AN-RAX CARD FRAME CONFIGURATION
TC: Termination Card i.e. LCC or CCM

B. NEW CABLES

The ARC & ARI cards are connected by 60 pin flat cable from the front of the cards as shown in **fig.7.**

The cable connection details are in table below.

Sl.No.	Cable Marker	Source Placement Position	Destination Connector Position
1	ACI 0	ARC FRONT, Master Frame slot 12	ARI FRONT, Slave Frame slot 12
2	ACI 1	ARC FRONT, Master Frame slot 15	ARI FRONT, Slave Frame slot 15.

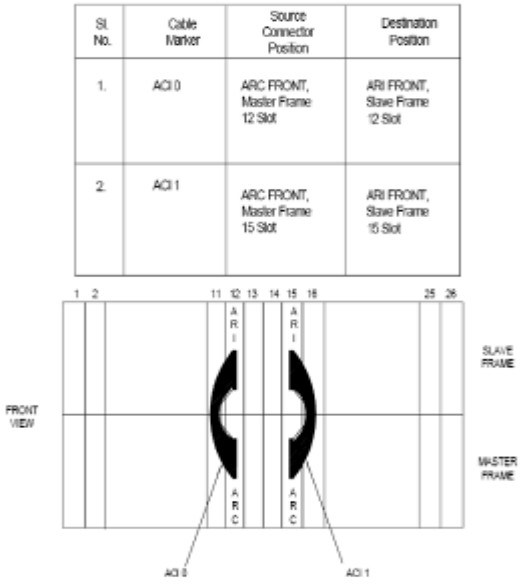

FIG.7
CABLE CONNECTION BETWEEN ARC & ARI CARD

VI. MAPPING OF L3 ADDRESSES TO AN-RAX HARDWARE SLOTS

The mapping L3 addresses as defined at LE and AN to the actual hardware port of line cards is shown in the table below. It is being assumed that the 'start L3 address' is 101 and all 248 possible subscribers are present.

Sl.No.	Card Slot	L3 Addresses
1	1-3	101-108
2	1-4	109-116
3	1-5	117-124
4	1-6	125-132
5	1-7	133-140
6	1-8 Note 1	141-148
7	1-9	149-156
8	1-10	157-164
9	1-17	165-172
10	1-18	173-180
11	1-19	181-188
12	1-20	189-196
13	1-21	197-204
14	1-22	205-212
15	1-23	213-220
16	1-24	221-228
17	2-3	229-236
18	2-4	237-244
19	2-5	245-252
20	2-6	253-260
21	2-7	261-268
22	2-8	269-276
23	2-9	277-284
24	2-10	285-292
25	2-17	293-300
26	2-18	301-308
27	2-19	309-316
28	2-20	317-324
29	2-21	325-332
30	2-22	333-340
31	2-23	341-348
32	2-24	349-356

NOTE: If an RTC card is placed in the slot, leave the corresponding 8 L3 addresses in sequence. The 8 L3 addresses should not be given to any subscriber. They should not be made in service at AN.

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NOTE: If the start L3 address programmed at LE is 201, then the L3 address of slot 1-3 will begin from 201, slot 1-4 will begin 209 and so on.

VII. CONCLUSION

The 256P AN-RAX is ideal for rural applications since it provides immediate basic telephone connections with minimal infrastructure. It is an easy to install fault-tolerant system with inbuilt redundancy.

Communication has forever been a problem in villages of the world. The world, as we know it, has been progressing rapidly, leaving these villages bereft of substantial social and economic gains.

The 256P AN-RAX from C-DOT is a world class cost-effective communication solution for rural areas. Development with the sole purpose of transforming the villages by removing natural barriers to progress through its versatility in any environment hot tropical areas, subzero mountainsous regions, vast deserts and costal areas, the 256P AN-RAX is an Access Network product.

Besides requiring no air-conditioning, it can withstand dust, wide temperature fluctuations (-50 C to 500 C), humidity and salinity. Moreover, it consumes very little power, sustaining itself despite frequent power failures due to low battery drain.

A distinguishing feature of the 256P AN-RAX is its simple and flexible connectivity through a wide range of transmission systems such as UHF, VHF, radio and satellite.

Because it is program-controlled it can be easily integrated as per the network requirements through man-machine commands, thus providing to be an extremely cost-effective and viable proposition.It can also assist in the setting up of service centers in any country that imports its technology and provide training to their technicians with the objective of making themselves reliant in handling technical problems.

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