Avaya Solution & Interoperability Test Lab

Application Notes for RAD Data Communications IPmux with Avaya Communication Manager using an E1 interface - Issue 1.0

Abstract

These Application Notes describe a solution for integrating RAD Data Communications IPmux Gateway with Avaya Communication Manager using two different media gateways, Avaya G650 and Avaya G350. RAD IPmux Gateway is connected to Avaya gateways through an E1 interface. RAD IPmux is a TDM over IP gateway that enables the TDM T1/E1 circuits to be extended over an IP/Ethernet network.

Information in these Application Notes has been obtained through DevConnect compliance testing and additional technical discussions. Testing was conducted via the DevConnect Program at the Avaya Solution and Interoperability Test Lab.

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1. Introduction

These Application Notes describe a solution for integrating RAD Data Communications IPmux (IPmux) Gateway with Avaya Communication Manager using two different media gateways, Avaya G650 and Avaya G350. IPmux gateway is connected to Avaya gateways through an E1 interface. RAD IPmux is a TDM over IP (TDMoIP) gateway that enables the TDM T1/E1 circuits to be extended over an IP/Ethernet network. RAD IPmux deploys TDMoIP technology (as well as standard CESoPSN, SAToP and HDLCoPSN) to extend voice and signaling protocols transparently over packet networks. An Avaya C364T-PWR Converged Stackable Switch and MM314 Power over Ethernet (PoE) HDDM Media Module on Avaya G350 were interconnected to each end of IPmux to provide the IP packet network.

For additional information on RAD Data Communications, refer to RAD IPmux documentation [3].

Figure 1 illustrates the network configuration used to verify the RAD Data Communication solution. An E1 interface was used between IPmux and Avaya gateways.

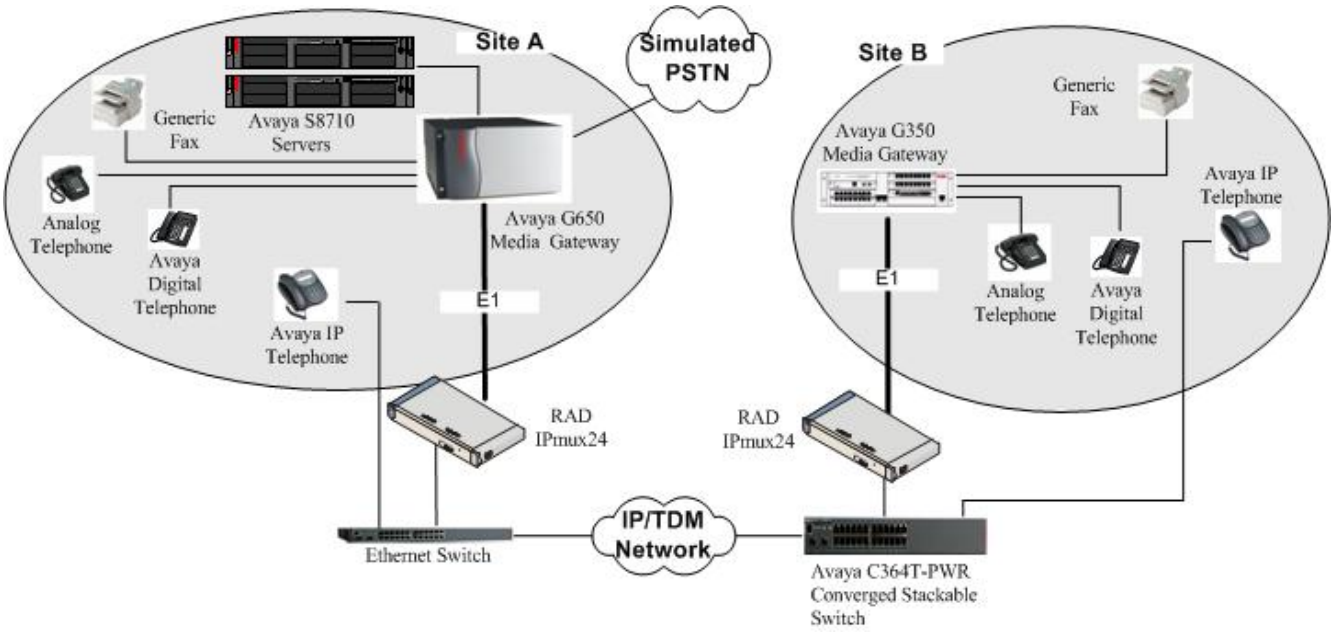

Figure 1 Test configuration of RAD IPmux with Avaya G650 and G350 Media Gateways (E1 Interface)

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2. Equipment and Software Validated

The following equipment and software were used for the sample configuration provided:

Equipment		Software/Firmware
Avaya S8710 Servers		Avaya Communication Manager 5.0 (R015x.00.0.825.4)
Avaya G650 Media Gateway with S8710 Servers		Avaya Communication Manager 5.0 (R015x.00.0.825.4)
	TN464GP DS1 Card	HW02 FW 022
	TN2312BP IP Server Interface	HW12 FW 40
	TN799DP C-LAN Interface	HW01 FW 26
Avaya 4600 Series SIP Telephones		2.2.2 (4610SW SIP) 2.3 (4602SW H.323) 2.6 (4610SW H.323) 2.5 (4625SW H.323)
Avaya one-X Desktop Edition		2.1 SP2
Avaya 6400 and 8400 Series Digital Telephones		-
Avaya C364T-PWR Converged Stackable Switch		4.5.14
Avaya G350 Media Gateway with S8300B Server		Avaya Communication Manager 4.0 (R014x.00.1.731.2)
	MM710AP DS1 Card	HW02 FW 018
	MM710AP DS1 Card	HW02 FW 018
RAD Device		
	IPmux	HW 00.00 FW 01.00

3. Configure Avaya Communication Manager

This section describes the necessary configuration on Avaya Communication Manager for E1 operations with IPmux. Configuration steps for configuring Avaya G650 and Avaya G350 are almost identical. Differences in configuration will be pointed out. The configuration of Avaya Communication Manager was performed using the System Access Terminal (SAT). Configuration in the following sections is only for the fields where a value needs to be entered or modified. Default values are used for all other fields. After completion of the configuration in this section, perform a **save translations** command to make the changes permanent. Refer to [1] for additional details.

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3.1. Verifying System Parameters

These steps are common for Avaya G650 and Avaya G350 and are to verify that the proper options are set.

Step	Description
1.	Enter the **display system-parameters customer-options** command and proceed to **Page 3** to verify that **DS1 MSP** field is set to **y**.

```
display system-parameters customer-options                      Page   3 of  10

    Abbreviated Dialing Enhanced List? n          Audible Message Waiting? n
        Access Security Gateway (ASG)? n              Authorization Codes? n
        Analog Trunk Incoming Call ID? n Backup Cluster Automatic Takeover? n
 A/D Grp/Sys List Dialing Start at 01? n                        CAS Branch? n
Answer Supervision by Call Classifier? n                          CAS Main? n
                                  ARS? y                 Change COR by FAC? n
                 ARS/AAR Partitioning? y  Computer Telephony Adjunct Links? n
          ARS/AAR Dialing without FAC? y   Cvg Of Calls Redirected Off-net? n
          ASAI Link Core Capabilities? n                       DCS (Basic)? n
          ASAI Link Plus Capabilities? n                 DCS Call Coverage? n
       Async. Transfer Mode (ATM) PNC? n                DCS with Rerouting? n
  Async. Transfer Mode (ATM) Trunking? n
              ATM WAN Spare Processor? n    Digital Loss Plan Modification? n
                                  ATMS? n                           DS1 MSP? y
                  Attendant Vectoring? n             DS1 Echo Cancellation? y
```

Step	Description
2.	Proceed to **Page 5** and verify that **Station and Trunk MSP** field is set to **y**.

```
display system-parameters customer-options                      Page   5 of  10
                                OPTIONAL FEATURES

                Multinational Locations? n                Station and Trunk MSP? y
 Multiple Level Precedence & Preemption? n      Station as Virtual Extension? n
                      Multiple Locations? n
                                                 System Management Data Transfer? n
         Personal Station Access (PSA)? n                 Tenant Partitioning? n
                       Posted Messages? n       Terminal Trans. Init. (TTI)? n
                       PNC Duplication? n                 Time of Day Routing? n
                  Port Network Support? y               Uniform Dialing Plan? y
                                                Usage Allocation Enhancements? y
              Processor and System MSP? n        TN2501 VAL Maximum Capacity? y
                    Private Networking? y
                    Processor Ethernet? n                 Wideband Switching? n
                                                                  Wireless? y
                          Remote Office? n
         Restrict Call Forward Off Net? y
                  Secondary Data Module? y
```


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3.2. Configuring DS1 for ISDN-PRI Trunks

The DS1 board comes with 24 channels T1 or 32 channels E1 mode. Following steps are for configuring a DS1 card for the ISDN-PRI trunks in E1 mode. **Step 1** is for configuring DS1 card on Avaya G650 and **Step 2** is for configuring DS1 card on Avaya G350.

Step	Description
1.	Configure as follows for Avaya G650: • On DS1 board, move the channel selection switch to **32**. • Enter the **add ds1 1a07** command and configure as follows: o **Name** – Any descriptive string. o **Bit Rate** – Set to **2.048**. o **Line Coding** – Set to **hdb3**. o **Signaling Mode** – Set to **isdn-pri**. o **Connect** – Set to **pbx**. o **Interface** – Set to **network**. o **Interface Companding** – Set to **alaw**.

```
add ds1 1a07                                              Page   1 of   2
                              DS1 CIRCUIT PACK

            Location: 01A07                          Name: E1 IPMUX
            Bit Rate: 2.048                 Line Coding: hdb3

      Signaling Mode: isdn-pri
             Connect: pbx                          Interface: network
   TN-C7 Long Timers? n                  Country Protocol: 1
Interworking Message: PROGress           Protocol Version: a
Interface Companding: alaw                           CRC? n
           Idle Code: 11111111
                                DCP/Analog Bearer Capability: 3.1kHz

                                            T303 Timer(sec): 4


      Slip Detection? n                 Near-end CSU Type: other
```


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Step	Description
2.	Enter the **add ds1 1v5** command and configure as follows for Avaya G350: • **Name** – Set to any descriptive string. • **Bit Rate** - Set to **2.048** for E1. • **Line Coding** – Set to **hdb3**. • **Signaling Mode** – Set to **isdn-pri**. • **Connect** – Set to **pbx** • **Interface** – Set to **user**. • **Interface Companding** – Set to **alaw**. Note: DS1 board has a soft setting for changing it from T1 to E1 and vice versa.

```
add ds1 1v5                                                Page   1 of   2
                                DS1 CIRCUIT PACK

            Location: 001V5                          Name: E1 IPMUX
            Bit Rate: 2.048                  Line Coding: hdb3

      Signaling Mode: isdn-pri
             Connect: pbx                          Interface: user
   TN-C7 Long Timers? n                  Country Protocol: 1
Interworking Message: PROGress           Protocol Version: a
Interface Companding: alaw                           CRC? n
           Idle Code: 11111111
                                DCP/Analog Bearer Capability: 3.1kHz

                                            T303 Timer(sec): 4


      Slip Detection? n                  Near-end CSU Type: other
```


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3.3. Configuring ISDN-PRI Trunks

To configure the trunks, a trunk group is added and then a signaling group for that trunk group is added. The trunk group is then modified to add the members of the trunk group.

Step	Description
1.	Enter the **add trunk-group** <**t**>, where **t** is an available trunk group and configure as follows: • **Group Type** – Set to **isdn**. • **Group Name** – Set to any descriptive string. • **TAC** – Enter any value per the dial plan. Set to **141** for this compliance testing. • **Service Type** – Set to **tie**.
	add trunk-group 41 Page 1 of 21 TRUNK GROUP Group Number: 41 Group Type: isdn CDR Reports: y Group Name: E1 PRI COR: 1 TN: 1 TAC: 141 Direction: two-way Outgoing Display? n Carrier Medium: PRI/BRI Dial Access? y Busy Threshold: 255 Night Service: Queue Length: 0 Service Type: tie Auth Code? n TestCall ITC: rest Far End Test Line No: TestCall BCC: 4
2.	Enter the **add signaling-group** <**s**> command, where **s** is an available signaling group and configure as follows: • **Group Type** – Set to **isdn-pri**. • **Primary D-Channel** – Set to **01A0716** for E1. • **Trunk Group for Channel Selection** – Set to **41**, the trunk group created in **Step 1**.
	add signaling-group 41 Page 1 of 5 SIGNALING GROUP Group Number: 41 Group Type: isdn-pri Associated Signaling? y Max number of NCA TSC: 0 Primary D-Channel: 01A0716 Max number of CA TSC: 0 Trunk Group for NCA TSC: Trunk Group for Channel Selection:41 Supplementary Service Protocol: a

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Step	Description
3.	Enter **change trunk-group** <**t**> command, where **t** is the trunk group created in **Step 1** and go to **Page 5** of the **trunk-group** form. Add 15 ports along with signaling group created in **Step 2**.

```
change trunk-group 41                                          Page   5 of  21
                                TRUNK GROUP
                                     Administered Members (min/max):   0/0
GROUP MEMBER ASSIGNMENTS                 Total Administered Members:   0

       Port    Code Sfx Name        Night           Sig Grp
  1: 01a0701  TN464  G                               41
  2: 01a0702  TN464  G                               41
  3: 01a0703  TN464  G                               41
  4: 01a0704  TN464  G                               41
  5: 01a0705  TN464  G                               41
  6: 01a0706  TN464  G                               41
  7: 01a0707  TN464  G                               41
  8: 01a0708  TN464  G                               41
  9: 01a0709  TN464  G                               41
 10: 01a0710  TN464  G                               41
 11: 01a0711  TN464  G                               41
 12: 01a0712  TN464  G                               41
 13: 01a0713  TN464  G                               41
 14: 01a0714  TN464  G                               41
 15: 01a0715  TN464  G                               41
```

4.	Go to **Page 6** of the **trunk-group** form and enter remaining 15 ports. Port **16** is used for signaling.

```
change trunk-group 41                                          Page   6 of  21
                                TRUNK GROUP
                                     Administered Members (min/max):   0/0
GROUP MEMBER ASSIGNMENTS                 Total Administered Members:   0

       Port    Code Sfx Name        Night           Sig Grp
 16: 1a0717   TN464  G                               41
 17: 1a0718   TN464  G                               41
 18: 1a0719   TN464  G                               41
 19: 1a0720   TN464  G                               41
 20: 1a0721   TN464  G                               41
 21: 1a0722   TN464  G                               41
 22: 1a0723   TN464  G                               41
 23: 1a0724   TN464  G                               41
 24: 1a0725   TN464  G                               41
 25: 1a0726   TN464  G                               41
 26: 1a0727   TN464  G                               41
 27: 1a0728   TN464  G                               41
 28: 1a0729   TN464  G                               41
 29: 1a0730   TN464  G                               41
 30: 1a0731   TN464  G                               41
```

5.	Repeat **Steps 1-4** to configure trunks in Avaya G350.

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3.4. Configuring Dial Plan/Routing

To route the calls properly between the two PBXs, a uniform dial plan is created. A route pattern is defined to handle the calls which match a certain criteria for the Called Party Number.

Step	Description
1.	Enter the **change uniform-dialplan** <**u**>, where **u** is the matching pattern and configure as follows: • **Matching Pattern** – Pattern to match for the Called Party Number. Set to **5** for this compliance test. • **Len** – Length of the Called Party Number. • **Net** – Set to **aar**.

	`change uniform-dialplan 5` Page 1 of 2
	`UNIFORM DIAL PLAN TABLE`
	`Percent Full: 0`
	
	`Matching Insert Node`
	`Pattern Len Del Digits Net Conv Num`
	`5 5 0 aar n`

2.	Enter the **change route-pattern** <**r**> command, where **r** is route pattern and configure as follows: • **Grp No** – Set to **41**, trunk group created in **Section 3.3**, **Step 1**. • **FRL** – Set to **0**.

	`change route-pattern 41` Page 1 of 3
	`Pattern Number: 41 Pattern Name:`
	
	`Grp FRL NPA Pfx Hop Toll No. Inserted DCS/ IXC`
	`No Mrk Lmt List Del Digits QSIG`
	`Dgts Intw`
	`1: 41 0 n user`
	`2: n user`
	`3: n user`
	`4: n user`
	`5: n user`
	`6: n user`
	
	`BCC VALUE TSC CA-TSC ITC BCIE Service/Feature BAND No. Numbering LAR`
	`0 1 2 3 4 W Request Dgts Format`
	`Subaddress`
	`1: y y y y y n n rest none`
	`2: y y y y y n n rest none`
	`3: y y y y y n n rest none`
	`4: y y y y y n n rest none`
	`5: y y y y y n n rest none`
	`6: y y y y y n n rest none`

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Step	Description
3.	Enter **change aar analysis** <**a**> command, where **a** is dialed string of the Called Party Number and configure as follows: • **Dialed String** – Partial or completely dialed number string. • **Total Min** – Minimum number of digits in the dialed string. Set to **5** for this compliance testing. • **Total Max** – Maximum number of digits in the dialed string. Set to **5** for this compliance testing. • **Route Pattern** – Set to **41**, the route pattern created in **Step 2**. • **Call Type** – Set to **aar**.
	change aar analysis 5 Page 1 of 2 AAR DIGIT ANALYSIS TABLE Percent Full: 6 Dialed String / Total Min / Total Max / Route Pattern / Call Type / Node Num / ANI Reqd 5 / 5 / 5 / 41 / aar / / n
4.	Repeat **Steps 1-3** to configure dialplan and routing in Avaya G350.

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3.5. Configuring E1 QSIG Trunks

The configuration for setting up an E1 QSIG trunk is similar to the E1 ISDN-PRI trunk and the only changes are on the DS1 form.

Step	Description
1.	Enter the **change ds1 1a07** and configure as follows on Avaya G650: • **Name** – Set to any descriptive string. • **Line Coding** – Set to **hdb3**. • **Signaling Mode** – Set to **isdn-pri**. • **Connect** – Set to **pbx**. • **Interface** – Set to **peer-master**.

```
change ds1 1a07                                                Page   1 of   2
                                DS1 CIRCUIT PACK

            Location: 01A07                          Name: E1 IPMUX
            Bit Rate: 2.048                   Line Coding: hdb3

      Signaling Mode: isdn-pri
             Connect: pbx                        Interface: peer-master
   TN-C7 Long Timers? n                      Peer Protocol: Q-SIG
Interworking Message: PROGress                        Side: b
Interface Companding: alaw                             CRC? n
           Idle Code: 11111111
                                 DCP/Analog Bearer Capability: 3.1kHz

                                            T303 Timer(sec): 4


      Slip Detection? n                  Near-end CSU Type: other
```


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Step	Description
2.	Enter the **change ds1 1v5** command and configure as follows for Avaya G350: • **Name** – Set to any descriptive string. • **Line Coding** – Set to **hdb3**. • **Signaling Mode** – Set to **isdn-pri**. • **Connect** – Set to **pbx** • **Interface** – Set to **peer-slave**.

```
change ds1 1v5                                              Page   1 of   2
                                DS1 CIRCUIT PACK

            Location: 001V5                          Name: E1 IPMUX
            Bit Rate: 2.048                  Line Coding: hdb3

      Signaling Mode: isdn-pri
             Connect: pbx                        Interface: peer-slave
   TN-C7 Long Timers? n                  Country Protocol: 1
Interworking Message: PROGress           Protocol Version: a
Interface Companding: alaw                           CRC? n
           Idle Code: 11111111
                                DCP/Analog Bearer Capability: 3.1kHz

                                            T303 Timer(sec): 4


      Slip Detection? n                 Near-end CSU Type: other
```


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3.6. Configuring E1 CAS Trunks

The following screens show how to configure a DS1 card for E1 CAS signaling mode. No signaling group needs to be specified. In cases where a previously configured DS1 card is used, then the DS1 card and its associated trunk and signaling groups should be removed prior to configuring the DS1 card for E1 CAS.

Step	Description
1.	Enter the **add ds1 1a07** command and configure as follows for Avaya G650: • **Name** – Set to any descriptive string. • **Line Coding** – Set to **hdb3**. • **Signaling Mode** – Set to **CAS**.
	`add ds1 1a07` Page 1 of 2 DS1 CIRCUIT PACK Location: 01A09 Name: E1 IPMUX Bit Rate: 2.048 Line Coding: hdb3 Signaling Mode: CAS Interconnect: pbx Country Protocol: 1 Interface Companding: alaw Idle Code: 11111111 Slip Detection? n Near-end CSU Type: other
2.	Enter the **add trunk-group** <**t**>, where **t** is an available trunk group and configure as follows: • **Group Type** – Set to **tie**. • **Group Name** – Set to any descriptive string. • **TAC** – Enter any value per the dialplan. Set to **141** for this compliance testing. • **Trunk Type** – Set to **wink/wink**.
	`add trunk-group 41` Page 1 of 20 TRUNK GROUP Group Number: 41 Group Type: tie CDR Reports: y Group Name: E1 CAS COR: 1 TN: 1 TAC: 141 Direction: two-way Outgoing Display? n Trunk Signaling Type: Dial Access? n Busy Threshold: 255 Night Service: Queue Length: 0 Incoming Destination: Comm Type: voice Auth Code? n Trunk Flash? N Trunk Type (in/out): wink/wink

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Step	Description
3.	Go to **Page 5** of the **trunk-group** form and add 15 ports.
	add trunk-group 41 Page 5 of 21 TRUNK GROUP Administered Members (min/max): 0/0 GROUP MEMBER ASSIGNMENTS Total Administered Members: 0 Port Code Sfx Name Night Mode Type Ans Delay 1: 01A0701 TN464 G 2: 01A0702 TN464 G 3: 01A0703 TN464 G 4: 01A0704 TN464 G 5: 01A0705 TN464 G 6: 01A0706 TN464 G 7: 01A0707 TN464 G 8: 01A0708 TN464 G 9: 01A0709 TN464 G 10: 01A0710 TN464 G 11: 01A0711 TN464 G 12: 01A0712 TN464 G 13: 01A0713 TN464 G 14: 01A0714 TN464 G 15: 01A0715 TN464 G
4.	Go to **Page 6** of the **trunk-group** form and enter remaining 15 ports.
	add trunk-group 41 Page 6 of 21 TRUNK GROUP Administered Members (min/max): 0/0 GROUP MEMBER ASSIGNMENTS Total Administered Members: 0 Port Code Sfx Name Night Mode Type Ans Delay 16: 01A0716 TN464 G 17: 01A0717 TN464 G 18: 01A0718 TN464 G 19: 01A0719 TN464 G 20: 01A0720 TN464 G 21: 01A0721 TN464 G 22: 01A0722 TN464 G 23: 01A0723 TN464 G 24: 01A0724 TN464 G 25: 01A0725 TN464 G 26: 01A0726 TN464 G 27: 01A0727 TN464 G 28: 01A0728 TN464 G 29: 01A0729 TN464 G 30: 01A0730 TN464 G
5.	Repeat **Steps 1-4** to configure Avaya G350.

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4. Configuring RAD Data IPmux Gateway

IPmux can be configured using either a Hyper Terminal or a telnet session. The following screens show the E1 configuration. IPmux configuration should match the local PBX configuration. . To configure IPmux telnet into the device, using a proper user name and password. At any given time, and especially after a configuration change, it is recommended to save the DB changes by pressing the "s" key.

4.1. Configuring E1 ISDN-PRI or QSIG

Step	Description
1.	At the **Main Menu** screen (Not shown), navigate to the **Configuration → Systems → Management->Host IP** page and configure the IP address of the device.
	1. IP address > (192.45.80.230) 2. IP Mask > (255.255.255.128) 3. Default Gateway > (192.45.80.1) 4. DHCP (Disable) 5. Read > (public) 6. Write > (private) 7. Trap > (public)
2.	Navigate to the **Configuration → Physical layer** page. Make sure the TDM Interface Type is **E1**.
	1. TDM Interface Type > (E1) 2. TDM 3. Eth
3.	Configure the physical layer parameters of the TDM port. Navigate to the **Configuration → Physical layer->TDM (E1)** page.
	Channel ID (1) Restoration Time > (CCITT) Signaling Mode (CAS Disabled) 1. Administrative Status (up) 2. Transmit Clock Source > (Adaptive) 3. Source Clock Quality > (other/unknown) 4. Trail Mode (Extention) 5. Line Type > (Framed G.704) 6. Line Interface (DSU) 7. Idle Code ... (7E)

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Step	Description
4.	Configure the PW Connection Parameters. Navigate to the **Configuration → Connection** page.
	PW Type > (TDMoIP CE) PSN Type (UDP/IP) 1. PW Host IP >** 2. Bundle ID[1-127] ... (1) 3. DS0 Bundle []>** 4. Bundle Connection >**
5.	Configure the time slots assignments. Navigate to the **Configuration → Connection → DS0 Bundle** page.
	+1 +2 +3 +4 +5 +6 +7 +8 +9 +10 TS 0 1 1 1 1 1 1 1 1 1 1 TS 10 1 1 1 1 1 0 1 1 1 1 TS 20 1 1 1 1 1 1 1 1 1 1 TS 30 1
	1. Change cell [0 – 1] ...(1)
6.	Navigate to the **Configuration → Connection->Bundle Connection** page to configure the PW Bundle parameters.
	1. Destionation IP Address ...(192.45.50.20) 2. Next Hop ...(-) 3. IP TOS[0 – 255] ...(0)
	4. Connection Status (Enable) 5. Destination Bundle[1 – 8063] ...(1) 6. TDM Bytes In Frame(x48 Bytes)[1 – 30] ...(3)
	7. Payload Format > (V2) 8. Far End Type > (E1) 9. OAM Connectivity (Enable) 10.Jitter Buffer [msec][2.5 – 200] ...(3.0)

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4.2. Configuring E1 CAS

Step	Description
1.	Setting up for the E1 CAS will be similar to ISDN-PRI or QSIG, except for the following single difference. Navigate to the **Configuration → Physical layer->TDM (E1)** page.

```
   Channel ID                     (1)
   Restoration Time            >  (CCITT)
   Signaling Mode                 (Cas Enabled)

1. Administrative Status          (up)
2. Transmit Clock Source        > (Internal)
3. Trail Mode                     (Extension)
4. Line Type                    > (Framed MF)
5. Line Interface                 (DSU)
6. Idle Code                   ...(7E)
7. Send Upon Fail                 (OOS code)
... (N)
```

5. Interoperability Compliance Testing

Interoperability compliance testing covered connectivity, error recovery, and feature functionality. Feature functionality testing verified the ability of IPmux TDM over IP solution to provide PBX to PBX communication to make, receive, transfer, and conference calls. Connectivity functionality testing verified that IPmux was able to connect to Avaya G650 and Avaya G350 gateways over E1 using ISDN-PRI, QSIG, and CAS.

5.1. General Test Approach

All test cases were performed manually. For each E1 configuration the direct connection between the Avaya G650 and Avaya G350 were tested first. Once, calls could be made between two sites, then, IPmux was introduced to verify the operation. The following features and functionality were verified:

- E1 connectivity with ISDN-PRI
- E1 connectivity with QSIG
- E1 connectivity with CAS
- Transfers and Conference calls
- Modem Calls
- FAX with various bandwidths
- DTMF

5.2. Test Results

All test cases passed. IPmux provided connectivity between Avaya G650 and G350 Media Gateways over E1. During the test, no problems were encountered.

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6. Verification Steps

To verify that the solution was properly configured in the field, the following steps can be taken.

After IPmux is connected, make sure that the physical connection (Layer 2) is good by executing "**test board 1AXX**", where **1** is the cabinet ID, **A** is the carrier ID and **XX** is the slot number of the DS1 board.

If the connection is OK, check the trunk status by running "**status trunk YY**" where YY is the trunk-group number.

Place calls between Site A and Site B to verify proper connectivity. Fax machines were utilized in Site A and Site B to verify proper operation (Tested with 4.8Kbps, 9.6Kbps and 14.4Kbps).

7. Support

For technical support call RAD Data Communications Support at (800) 444-7234 or send email to techsup@radusa.com.

8. Conclusion

These Application Notes describe a solution for integrating RAD Data Communications IPmux Gateway with Avaya Communication Manager using two different media gateways, Avaya G650 and Avaya G350. RAD Data IPmux Gateway is connected to Avaya gateways through an E1 interface. RAD Data IPmux is a TDM over IP gateway that enables the TDM T1/E1 circuits to be extended over an IP/Ethernet network. The systems interoperated successfully, providing a suitable solution for TDMoIP in the PBX-to-PBX environment.

9. References

This section references the Avaya and RAD Data Communications documentation that are relevant to these Application Notes.

The following Avaya product documentation can be found at http://support.avaya.com.

[1] *Administration for Network Connectivity for Avaya Communication Manager*, Issue 13, January 2008, Document Number 555-233-504.
[2] *Administrator's Guide for Avaya Communication Manager*, Issue 4, January 2008, Document Number 03-300509.

The following product documentation is provided by RAD Data Communications. For additional product and company information, visit http://www.radusa.com.

[3] *RAD IPmux-24 Installation and Operation Manual*: *Version 1*

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