Application Note

Configuring the IPLink™ Dual WAN Port Router for E1 Drop-&-Insert

Applies to the following products

- IPLink™ Model 2620/KK

Application Overview

This application note describes the configuration of the drop-&-insert feature in the Patton Model 2620/KK. As shown in figure 1, the 2620/KK connects to the Central Office through E1 WAN port 1 and to the PBX through E1 WAN port 2. WAN port 2 is configured to carry all the voice traffic to a PBX. The voice bandwidth comes from WAN port 1. The remaining bandwidth of WAN port 1 "drops" into the router for IP routing or Ethernet bridging.

Since WAN port 2 bears the voice channels, it must communicate the signaling on time slot 16 from the Central Office.

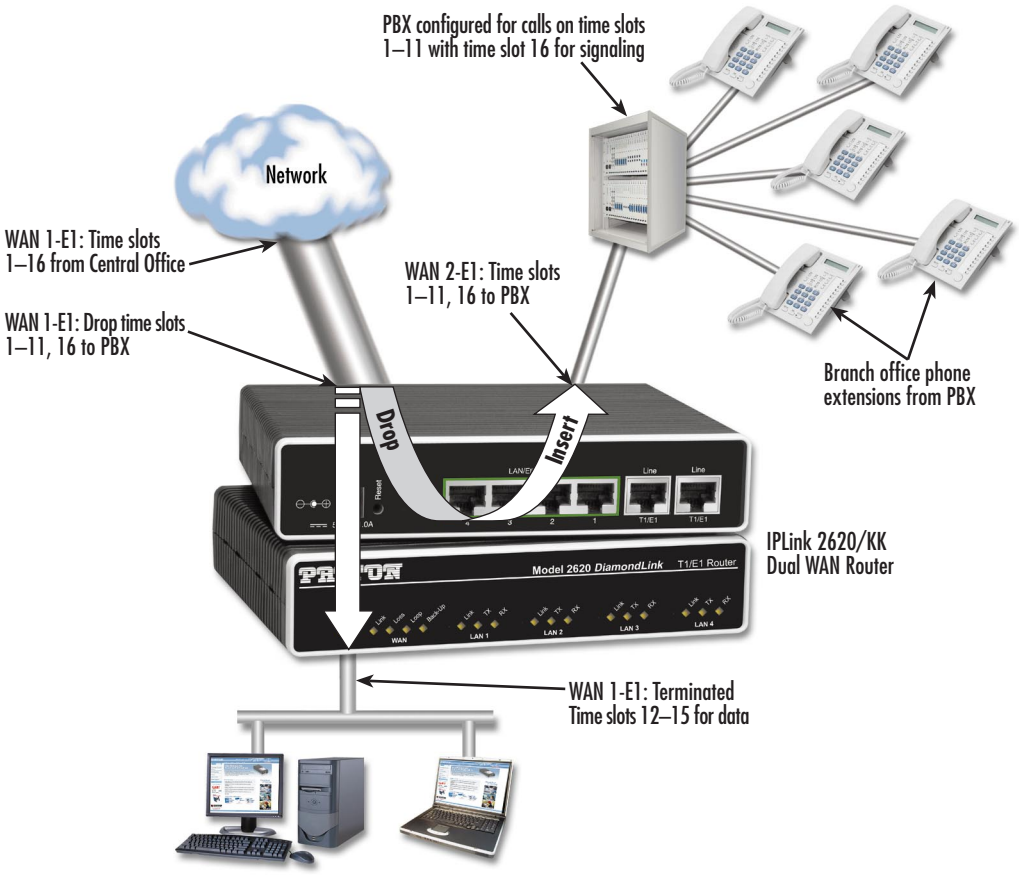

Figure 1. Drop-&-insert application

The mapping diagram & worksheet

The PBX, appearing at the bottom of figure 2 uses time slots 1–11 from the E1. The network design in this application calls for 11 outgoing phone lines. The telephone company (PTT) has allocated time slots 1–11 for the phone calls. In an E1 environment time slot 16 is responsible for carrying the signaling traffic for bit-oriented signaling (R2) or message-oriented signaling (ISDN). Therefore, time slot 16 must be mapped from the telco to the PBX. The 11 time slots for the voice communication are highlighted in yellow in figure 2. The mapping is represented by the arrows from the Central Office to WAN port 1 through WAN port 2 and to the PBX.

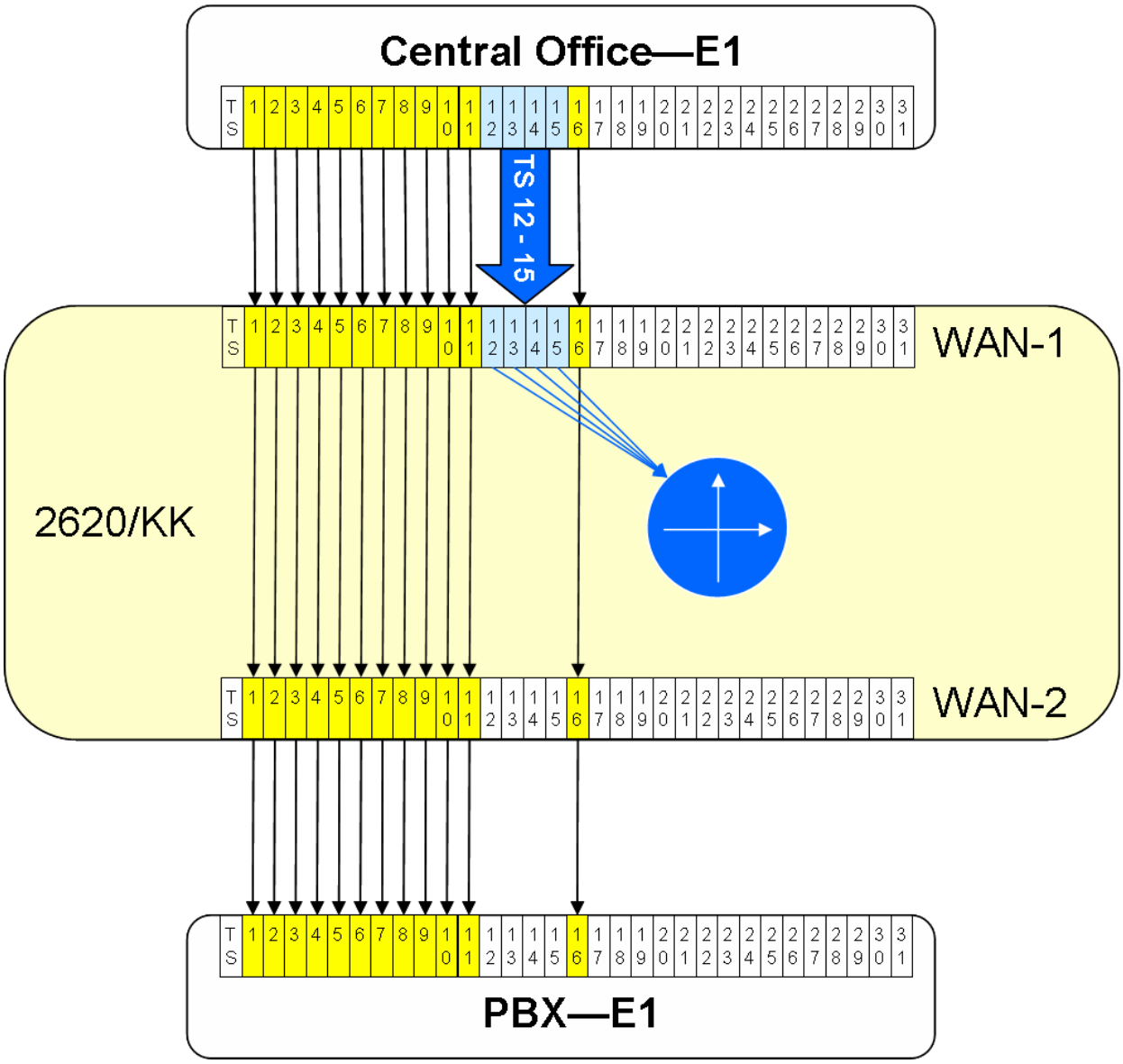

Figure 2. Time slot diagram for drop-&-insert application

The bandwidth for network communication has been set for 256 kbps. Time slots 12–15 on the telco's E1 are provisioned for network communication and are terminated inside the 2620/KK IPLink. These time slots in figure 2 are highlighted by a grayish blue color in both the CO's and WAN port 1's E1.

Time slots 17–31 are unused by the branch office from the telco's E1. All unused time slots are shown in white.

At this point, we can fill out the drop-&-insert worksheet (see table 1).

Table 1. Drop-&-insert worksheet—initial information

	BW (kbps)	# of TS for Phone Calls	# of TS for Signaling	Total # of Time Slots	Signaling Time Slot #	Time Slot #'s	WAN Port
Phone (Drop)		11	1	= 12	**#16**		**1**
Phone (Insert)		11	1	= 12	**#16**		**2**
Network access	256	**N/A**	**N/A**	4	**N/A**		**Only port 1**

The steps for completing the table follow. Fill in the cells of the table which do not have **bold** text (the empty cells).

- Here is what we want in the design for this branch office. In other words, this is information required before filling out the table. (Refer to table 1.)
  - Eleven (11) phone lines connected from the CO to the PBX.
  - Time slot 16 must be used in WAN 1 and 2 ports for the phone call signaling.
  - Total number of time slots for phone lines is 12 (11 phone lines + 1 for signaling).
  - Network bandwidth of 256 kbps (determined by the network manager for Internet access). (256 kbps / 64 kbps = 4 time slots)

The next step is to assign specific time slots in the two E1 WAN ports. We use the information listed above. (Refer to table 2 for completed information.)

- Bandwidth for the phone connections
  - 12 time slots for the phone connections.
  - 12 x 64 kbps per time slot = 768 kbps.
  - WAN Port 1 time slots #1–11 (Assigned by the Telco/PTT).
  - Signaling time slot #16 (always required for signaling on an E1) = 64 kbps.
  - We will select WAN Port 2 time slots #1–11 and #16 for the phone calls and signaling, respectively.
  - Check the drop-&-insert bandwidths for phone. They must be equal.

Table 2. Drop-&-Insert worksheet—completed information

	BW (kbps)	# of TS for Phone Calls	# of TS for Signaling	Total # of Time Slots	Signaling Time Slot #	Time Slot #'s	WAN Port
Phone (Drop)	768	11	1	12	**#16**	#1–11, 16	**1**
Phone (Insert)	768	11	1	12	**#16**	#1–11, 16	**2**
Network access	256	**N/A**	**N/A**	4	**N/A**	12–15	**Only 1**

- Network data access
  - Bandwidth is 256 kbps and is provided by the Telco/PTT on time slots 12–15 on WAN Port #1.
  - Since these time slots are terminated on the router, they are not used in WAN Port #2.

- WAN Ports 1 & 2. Now we combine and choose only the data required to configure the E1 ports and the drop-&-insert function.
  - WAN Port #1. All time slots needed for both phone calls and network access are TS #1–11, 16 and TS #12–15, respectively. *This means TS#1–16 must be activated.*
  - WAN Port #2. We only need to activate the time slots for the phone calls. From row 2 of table 2, *activate time slots #1–11 and #16.*
- Drop-&-Insert.
  - The only required information for configuration is which time slots are used for Drop (WAN Port #1) and which for Insert (WAN Port #2). In the columns **Phone (Drop)** and **Phone (Insert)**, the column **Time Slot #'s** already has the information. (Refer to table 2.)

At this point, we have all the information for configuration. Refer to the last two primary bullets and table 2.

Configuration steps for the 2620/KK IPLink router

Do the following to finish configuring the drop-&-insert application.

1. Configure WAN ports.
   – Configure WAN port #1. Activate the correct time slots.
   – Configure WAN port #2. Activate the correct time slots.
2. Configure the drop-&-insert time slots for WAN ports 1 and 2.
3. Configure the WAN connection service.

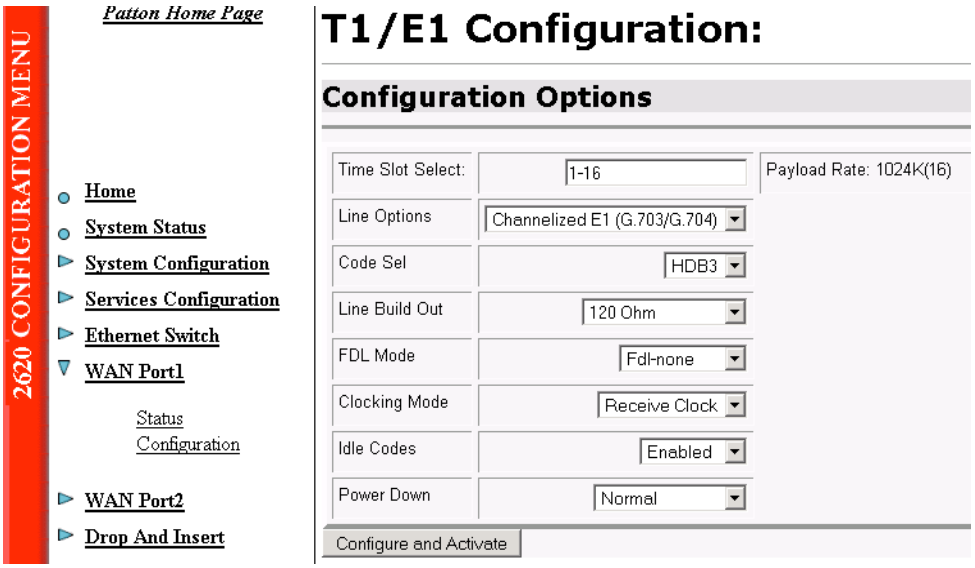

Figure 3. WAN Port #1-E1 configuration

Configure the WAN ports

The time slots for both E1 WAN ports must be configured prior to the Drop-&-Insert configuration. If it was not correctly done, you will see a message declaring why it is an invalid configuration.

Configure the E1 of WAN port #1 as follows. (Refer to figure 3.)

- *Time Slot Select:* 1–16
- *Line Options:* Channelized E1 (G.703/G.704)
- *Code Sel:* HDB3 or AMI. Most telco switches use HDB3.
- *Line Build Out*:
  - 120 Ohm if using twisted pair E1 connection
  - 75 Ohm if using dual coax E1 connection
- *Clocking Mode*: Typically the telco is the clock source, so select Receive Clock.
- *Power Down*: Normal to activate the E1 port.

Click the **Configure and Activate** button to save the settings in volatile memory. The effect in the 2620 is immediate.

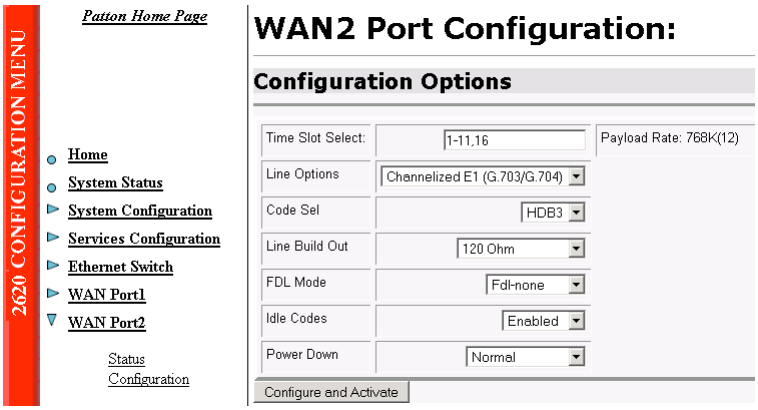

Figure 4. WAN port #2-E1 configuration

Configure the E1 of WAN port #2 as follows. (Refer to figure 4.)

- *Time Slot Select*: 1–11, 16
- *Line Options*: Channelized E1 (G.703/G.704)
- *Code Sel*: HDB3 or AMI. Most telco switches use HDB3.
- *Line Build Out*:
  - 120 Ohm if using twisted pair E1 connection
  - 75 Ohm if using dual coax E1 connection
- There is no clocking mode for WAN Port #2 because it synchronizes with WAN Port #1.
- *Power Down*: Normal to activate the E1 port.

Click the **Configure and Activate** button to save the settings in volatile memory. The effect in the 2620 is immediate.

Configure the drop-&-insert time slots for the WAN ports

Referring to figure 2, configure the drop-&-insert time slots as shown in figure 5.

- WAN1 TimeSlot DROP: enter 1–11, 16

- WAN2 TimeSlot DROP: enter 1–11, 16

Click on the **Configure** button to save the configuration in volatile memory.

The drop-&-insert application is now configured.

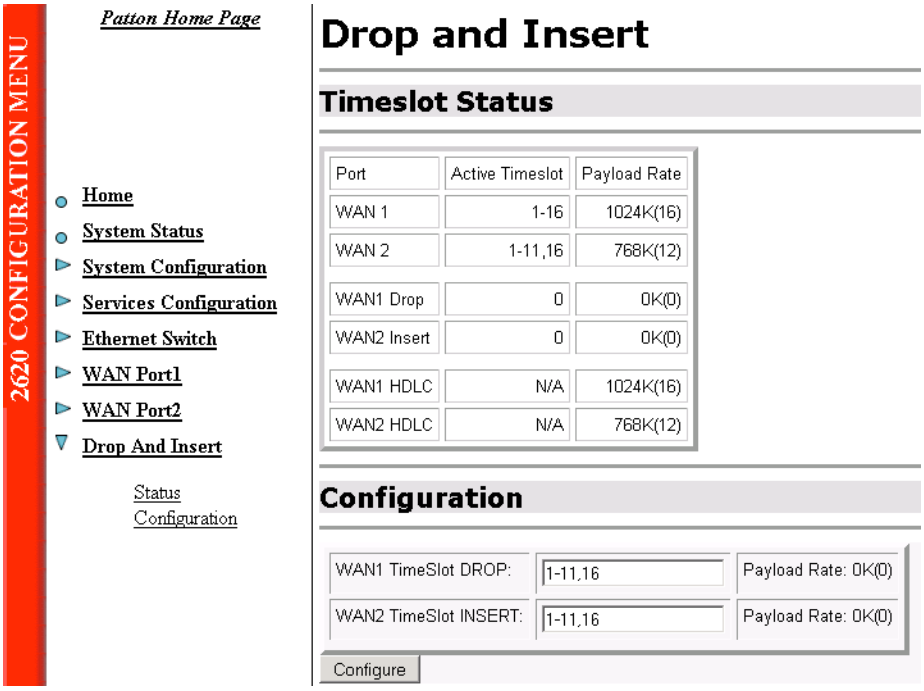

Figure 5. Configuration of Drop-and-Insert timeslots

Click on *Status* under *Drop And Insert* in the *Configuration Menu* to see the actual configuration.

Note WAN 1 has a total bandwidth of 1024 kbps and WAN 2's total bandwidth is 768 kbps. The difference between these two bandwidths is 256 kbps which is the bandwidth of the network access connection.

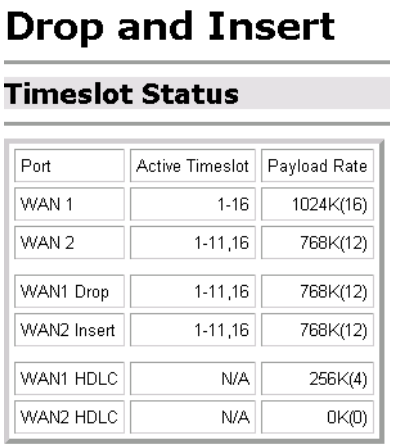

Figure 6. Status of configured drop-&-insert timeslots

Notice in figure 6 that the *WAN1 HDLC Active Timeslots* is *N/A*. It is necessary to configure the WAN connection and establish a connection. Then the active timeslot cell in the table will show the allocated time slots as configured. Refer to the next section for WAN connection services.

Configure the WAN connection service

For the network access connection to work, the last essential step in configuration is the WAN connection service. Select either PPP or Frame Relay. Both of these layer two protocols can be configured for bridge or routed operation. Refer to other documentation for the Model 2620 IPLink for these configurations.

Last but not least

Do not forget to save the configuration in non-volatile (persistent) memory. Click the *Save* hyperlink under the *System Configuration* menu item, then click the **Save** button (see figure 7) to confirm that you want to save the configuration.

Figure 7. Save the configuration in non-volatile memory

Appendix A **Drop-and-insert worksheet**

Table 3 is for your use when configuring the drop-&-insert application. Print this page to do your calculations.

Table 3. Drop-and-insert worksheet

	Bandwidth	#of Time Slots for Phone Calls	Total #of Time Slots	Signaling Time Slot	Time Slot #'s	WAN Port
Phone (Drop)				**#16**		**1**
Phone (Insert)				**#16**		**2**
Network access		**n/a**		**n/a**		**Only port 1**

Contacting Patton

If you have any additional questions please feel free to contact Patton's Technical Support:

- E-mail support—e-mail sent to **support@patton.com** will be answered within 1 business day
- Telephone support—standard telephone support is available five days a week—from **8:00 am** to **5:00 pm EST** (**1300** to **2200 UTC**)—by calling **+1 (301) 975-1007**

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