Application Note 108

Supporting Extra LEDs with the KS8695X 5-Port Integrated High Performance Gateway

KS8695X

General Description

If an extra LED is needed to support legacy implementations, there are two possible solutions.

The first solution uses a single GPIO per port as the speed LED indicator.

The second solution uses two GPIOs plus an external chip to provide a third LED indicator per Ethernet port. Although this solution requires an external chip, it uses a minimal number of GPIOs to provide a third LED indicator per Ethernet port. Figure 1 shows the hardware connection for this solution.

LED Information

The KS8695X has two LED indicators per Ethernet port. Each of these LED indicators can be configured to indicate the following: Speed, Link, Full duplex, Collision, Activity, Full duplex/Collision, or Link/Activity.

The LAN LEDs are configured in the KS8695X Switch Engine Control Register at offset 0xE800. Bits 27:25 control LANxLED1 and bits 24:22 control LANxLED0.

The WAN LEDs are configured in the KS8695X WAN Miscellaneous Control Register at offset 0xEA0C. Bits 6:4 control WAN LED1 and bits 2:0 control WAN LED0.

The programming values are given in Table 1.

Bits	LED Indicator	LED State
000	Speed	On
001	Link	On
010	Full Duplex	On
011	Collision	Blink
100	Activity	Blink
101	Full Duplex/Collision	On/Blink
110	Link/Activity	On/Blink
111	Disabled	Off

Table 1. Bit Programming Values for LEDs

Advantage and Disadvantage of the Second Solution

The advantage of the second solution is that it uses a minimum number of GPIOs to provide a third LED indicator per Ethernet port. Figure 1 shows the hardware connection for the second option.

The disadvantage is that it requires an external integrated circuit (IC).

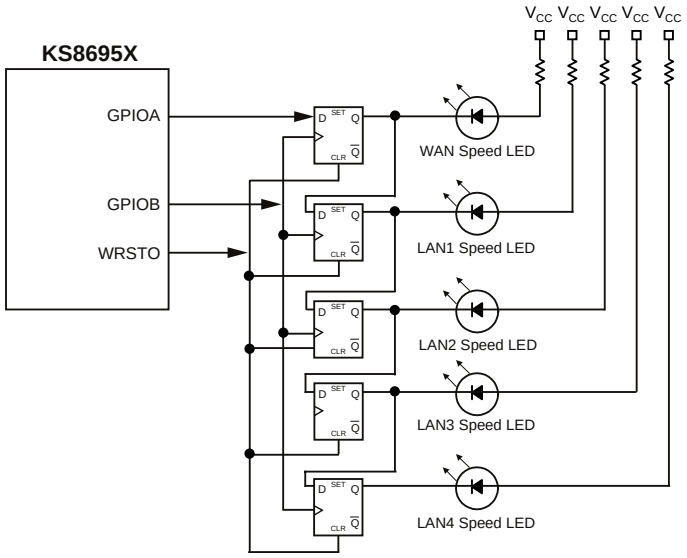

Figure 1. LED Support Using Minimum GPIO

Implementation

To implement this solution, use a 74LS174 or similar IC. The 74LS174 contains six D-type flip-flops; however, only five D-type flip-flops are shown in the Figure 1.

Software to read the connection speed of each port of the port registers also needs to be written. This code generates a serial data stream consisting of each port's link speed on GPIOA. The software also toggles the state of GPIOB, which serves as the clock signal. By toggling GPIOB as the clock signal, the software shifts the serial data on GPIOA into the appropriate registers to indicate the speed for each port. Figure 2 shows a timing diagram that illustrates how port speed data is shifted into the registers.

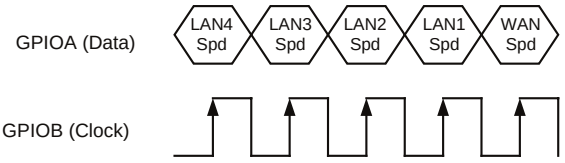

Figure 2. Serial Shift Speed Data Timing Diagram

The reset input on the 74LS174 is connected to the KS8695X reset output WRSTO. This ensures that the 74LS174 comes up in a known state at reset time, before any programming of the registers is done. This cost effective solution provides an effortless means to support three LEDs per port.

For additional support, contact your local Micrel Field Application Engineer or salesperson.

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