### General Features
- 16-bit Scrambler/De-scrambler
- Designed specifically for the Actel ProASIC3 and derivatives
- Allows scrambling or de-scrambling two 8-bit PCI Express symbols in parallel
- Ideal for use with PHY chips using 16-bit PIPE interface (e.g., TI XIO1100 x1 PHY)
- Low device utilization – less than 1% of an A3P1000
- Extensively verified in simulations and hardware

### Scrambler/De-scrambler Features
- Scrambling is applied to Data characters associated with DLLPs and TLPs including logical idles and TS1 and TS2 ordered sets
- K characters are not scrambled and bypass the scrambling logic
- Compliance-pattern-related characters are not scrambled
- When a COM character exits the scrambler the COM does not get scrambled, but it initializes the LFSR to 16’hFFFF
- COM character initializes the de-scrambler to 16’hFFFF
- LFSR does not advance on SKP characters

### Benefits
- Implements complex scrambling/de-scrambling algorithm in very few tiles
- Allows use of 16-bit PHY interface
- Simplifies meeting PCI Express timing requirements by halving the internal data rate