



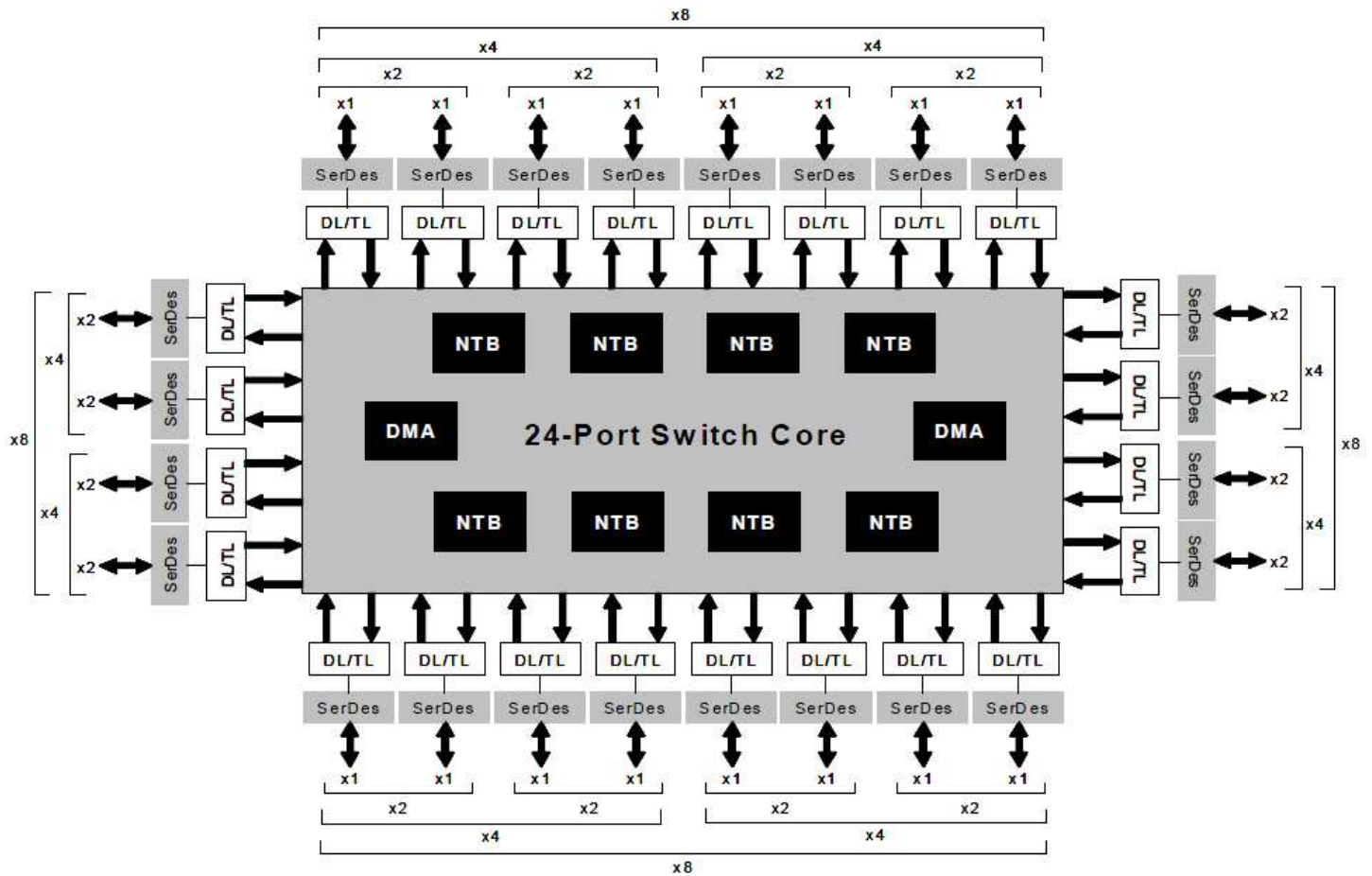
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Author: SSP Marketing  
IDT Confidential

## Introduction

The IDT 89HxxNTyyG2 family of PCI Express switches contain an extensive feature list that address application requirements in storage, communications and other embedded systems. This product line contains switch variants ranging from 2 to 24 ports and 12 to 32 lanes. This document will clarify the lane and port configurations within the 89HxxNTyyG2 switch family.

## Block Diagram





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## Feature and Functionality

### **Non-Blocking Architecture**

- Low latency via cut-through mode
  - Adaptive cut-through mode
- 5.0GT/s (Gen 2) and 2.5GT/s (Gen 1) operation

### **Standards and Compatibility**

- PCI Express Base Specification 2.1 compliant
- Implements optional PCI Express features:
  - Access Control Services (ACS)
  - Alternative Routing ID (ARI)
  - Device Serial Number Extended Capability
  - Sub-System ID and Sub-System Vendor ID
  - VGA and ISA enable
  - L0s and L1 ASPM

### **Port Configurability**

- Automatic per port link width negotiation
- Unused lanes shut down for power savings
- Crosslink support
- Automatic lane reversal
- Per lane control of de-emphasis, receive equalization, drive strength

### **Switch Partitioning**

- Family supports up to 8 fully independent partitions
- Configurable downstream port device numbering
- Supports dynamic reconfiguration of switch partitions

### **Non-Transparent Bridge (NTB)**

- Up to 8 NT endpoints per switch (see table)
- Configurable as endpoint or upstream mode, with or without DMA
- Unlimited outstanding transactions through NT
- 64 masters, 6 BARs per NT Endpoint

### **Flexible Multi-Host Failover**

- Four independent capability structures support:
  - Software (Root or SMBus) initiated failover
  - Signal (i.e., GPIO pin) initiated failover
  - Watchdog timer initiated failover
- Supports stateful and stateless failover

### **Event Signaling**

- Monitoring and signaling of multiple events via INTx or MSI
- Flexible configuration of partitions' event monitoring and signaling

### **High performance DMA controller**

- 4 independent DMA channels (see table)
  - Two DMA modules, each supporting 2 channels
- 32-bit and 64-bit fly-by transfers, up to 4GB with single descriptor
- Intra- as well as inter-partition data transfers using the NTB endpoint
- DMA to multicast groups
- Linked list descriptor based operation, supports scatter/gather
- Flexible addressing modes—linear and constant

### **Multicast**

- PCI Express Base 2.1 Specification Compliant
- 64 groups, Multicast overlay mechanism

### **Clocking**

- Supports 100 MHz and 125 MHz reference clock frequencies
- Ports may operate with an independent Spread Spectrum Clocking (SSC) clock, global common or global non-common clock

### **On-Die Temperature Sensor**

- 0°C to 127.5°C
- Programmable thresholds and alarms
- Automatic recording of max high and min low

### **Initialization / Configuration**

- Root (BIOS, OS, or driver), Serial EEPROM, or SMBus initialization

### **Quality of Service (QoS)**

- Port arbitration
- Request metering enables efficient utilization of switch buffers

### **Reliability, Availability and Serviceability (RAS)**

- ECRC support
- AER on all ports
- Internal Error reporting
- SECDED ECC protection on all internal RAMs
- End-to-end data path parity protection
- Checksum Serial EEPROM content protected
- Ability to generate an interrupt (INTx or MSI) on link up/down transitions

### **Test and Debug**

- Ability to inject AER errors
- Supports IEEE 1149.6 AC JTAG and IEEE 1149.1 JTAG



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## Product Options

### Full Featured 89HxxNTxxG2

Part Number "89H#"	PCIe Lanes	Switch Ports	NTB Ports	DMA Engines	Port Clocks	Slave SMBus Add.	Package Size	Stack Definition	Stack0				Stack1				Stack2								Stack3							
								Port	P0	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14	P15	P16	P17	P18	P19	P20	P21	P22	P23
								NTB Support	✓		✓		✓		✓		✓		✓		✓		✓		✓		✓		✓		✓	
DMA Support	✓																															
Clocking Domain	POCLK	P2CLK			P4CLK		P6CLK		P8CLK				P12CLK				P16CLK				P20CLK											
Port	P0	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14	P15	P16	P17	P18	P19	P20	P21	P22	P23								
32NT24AG2	32	24	8	2	8	2	23 x 23	32NT24AG2	x8	x8				x8								x8										
									x4	x4			x4		x4		x4				x4				x4							
									x2	x2	x2	x2	x2	x2	x2	x2	x2	x2		x2		x2		x2		x2		x2		x2		
									x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1
32NT8AG2	32	8	8	2	8	2	23 x 23	32NT8AG2	x8	x8				x8								x8										
									x4	x4			x4		x4		x4				x4				x4							
									x2		x2		x2		x2		x2				x2				x2				x2			
									x1		x1		x1		x1		x1				x1				x1				x1			
24NT24AG2	24	24	8	2	8	2	23 x 23	24NT24AG2	x1	x1	x1	x1	x1	x1	x1	x1	x8								x8							
									x1	x1	x1	x1	x1	x1	x1	x1	x4				x4				x4							
									x1	x1	x1	x1	x1	x1	x1	x1	x2		x2		x2		x2		x2		x2		x2			
									x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1
24NT6AG2	24	6	6	2	6	2	23 x 23	24NT6AG2	x8	x8				x8																		
									x4	x4			x4		x4		x4				x4											
									x2		x2		x2		x2		x2				x2				x2				x2			
									x1		x1		x1		x1		x1				x1				x1				x1			



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### Smaller 89HxxNTxxG2

Part Number "89H#"	PCIe Lanes	Switch Ports	NTB Ports	DMA Engines	Port Clocks	Slave SMBus Add.	Package Size	Stack Definition	Stack0				Stack1				Stack2								Stack3										
								Port	P0	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14	P15	P16	P17	P18	P19	P20	P21	P22	P23			
								NTB Support	✓					✓		✓			✓				✓				✓				✓				
								DMA Support	✓										✓																
								Clocking Domain									P8CLK								P16CLK										
Port	P0	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14	P15	P16	P17	P18	P19	P20	P21	P22	P23											
16NT16G2	16	16	4	2	2	2	19 x 19	16NT16G2	x1	x1	x1	x1					x8								x4										
									x1	x1	x1	x1					x4				x4														
									x1	x1	x1	x1					x2				x2								x2			x2			
									x1	x1	x1	x1					x1	x1	x1	x1	x1	x1	x1	x1					x1	x1	x1	x1			
12NT12G2	12	12	3	2	2	2	19 x 19	12NT12G2	x1	x1	x1	x1					x4										x4								
									x1	x1	x1	x1					x4																		
									x1	x1	x1	x1					x2												x2			x2			
									x1	x1	x1	x1					x1	x1	x1	x1									x1	x1	x1	x1			
24NT24G2	24	24	8	2	2	2	19 x 19	24NT24G2	x1	x1	x1	x1	x1	x1	x1	x1	x1	x8																	
									x1	x1	x1	x1	x1	x1	x1	x1	x4				x4										x4			x4	
									x1	x1	x1	x1	x1	x1	x1	x1	x2				x2								x2			x2			x2
									x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1					x1	x1	x1	x1	x1	x1	x1
									x1	x1	x1	x1	x1			x1																			
22NT16G2	22	16	8	2	2	2	19 x 19	22NT16G2	x1	x1	x1	x1	x1			x1																			
									x1	x1	x1	x1	x1			x1																			
									x1	x1	x1	x1	x1			x1													x2			x2			x2
									x1	x1	x1	x1	x1			x1													x1	x1	x1	x1	x1	x1	x1
16NT2G2	16	2	2	1	2	2	19 x 19	16NT2G2										x8																	
																	x4																		
																	x2												x2						
																	x1												x1	x1	x1	x1	x1	x1	x1

