

Exploiting the P2P capabilities of PXI Express with Signadyne Modules

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April 15th, 2015
PXI Day France

Company Overview

PXIe P2P Basics

Signadyne P2P Products and Application Examples

Company Overview



Test & Measurement
Embedded Monitoring & Control



High-performance Real-time Experts



Modular Hardware

- Vector Signal Generators, Analyzers and Transceivers
- Arbitrary Waveform Generators, Digitizers, etc.
- Digital High-speed I/O (Digital Waveform Generators/Analyzers, etc.)
- Time-to-Digital Converters (Timestamping, Counters, Correlators, etc.)
- In-chassis Data Storage (SSD)

PXI Express™



High-performance Products

Highest Channel Density Modules

Exclusive real-time HVI technology

Novel FPGA-programming technology

Other form factors available under request

CompactPCI® Serial

OpenVPX

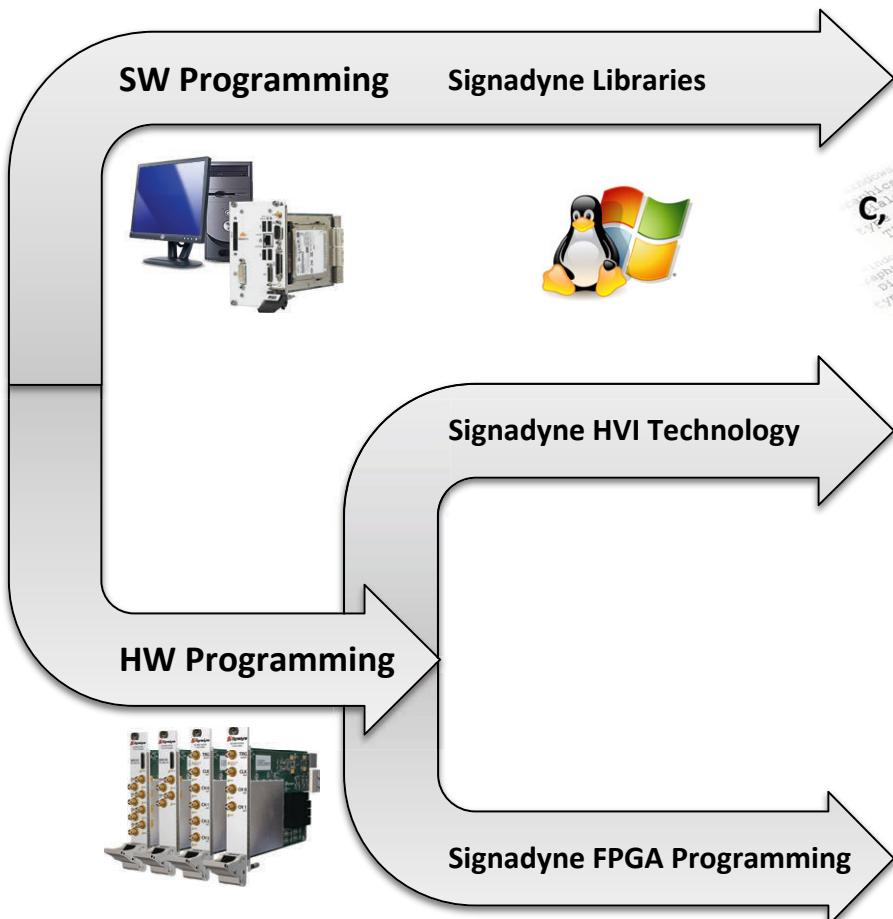
PCI EXPRESS

μTCA®

ETHERNET

USB
UNIVERSAL SERIAL BUS

Signadyne Programming Tools Overview



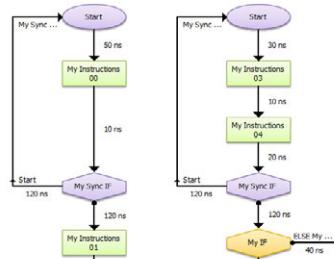
Signadyne Programming Libraries



- Full software compatibility
- Easy integration in the final application
- Native libraries for most common languages
- Full interoperability with other manufacturers
- Windows and Linux

C, C++, C#
Windows, Linux, C/C++ DLLs

Signadyne HVI Technology



Signadyne HVI Technology

- Intuitive flowchart-style programming: Signadyne PROCESSflow
- True hard real-time
- Ultra-fast execution and decision making
- Off-the-shelf inter-module synchronization
- Seamless interaction with SD Libraries

FPGA-like performance
without VHDL programming

Signadyne FPGA Programming



VHDL
Verilog



Signadyne FPGA Technology

- Intuitive graphical hardware customization interface: Signadyne FPGAflow
- Graphical FPGA programming using MATLAB/Simulink
- VHDL and Verilog programming
- Distributed real-time signal processing with P2P capabilities

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PXIe P2P Basics

Signadyne P2P Products and Application Examples

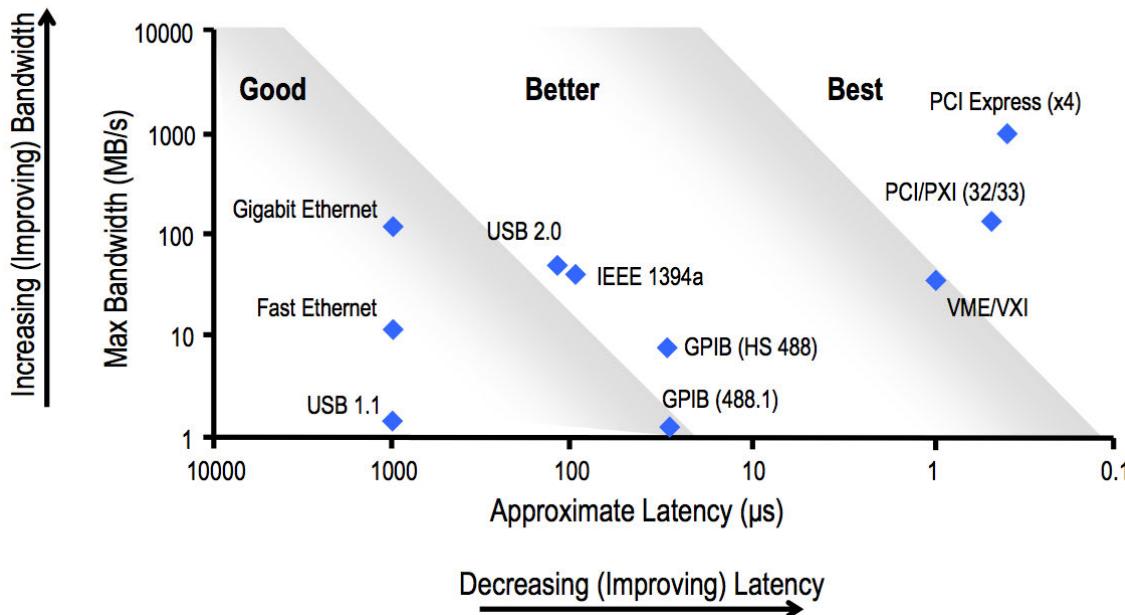
PXI Express is based on the ultra-fast PCI Express

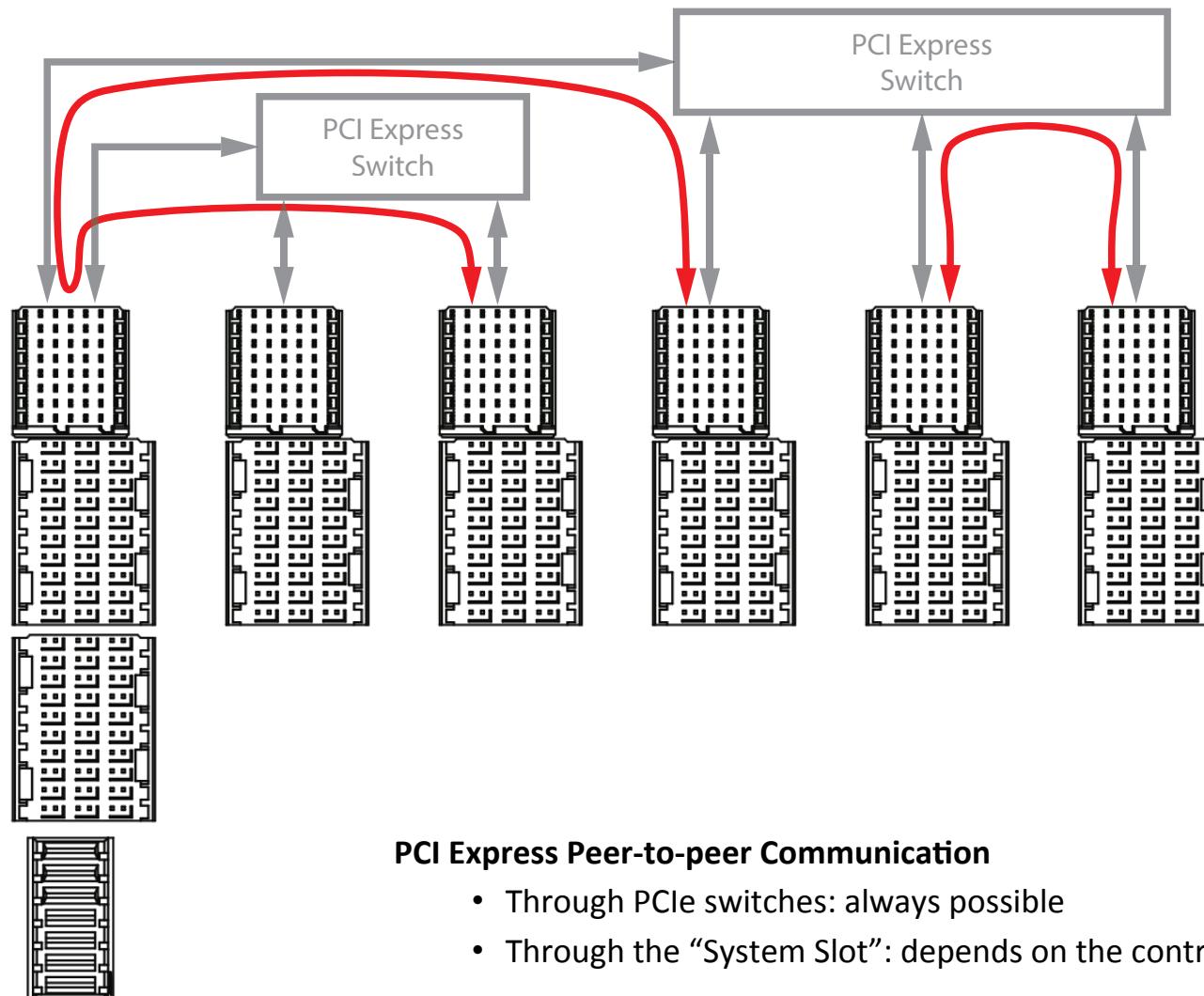
- Dedicated bandwidth per device: **serial point-to-point Interconnect with P2P capabilities**
- Ultra-fast: up to 0.5 GBytes/s per lane (Gen 2)
- Low EMC radiation and high EMC immunity: Low-voltage Differential Signaling
- Compatibility: PCI software model
- Longevity:
 - Driven by the PC industry
 - Gen 2, Gen 3, Gen 4, ... (speed upgrades)

Topology and speed depends on:

- The backplane (chassis)
- The PXIe controller
- The peripheral modules

Bandwidth vs. Latency





Company Overview

PXIe P2P Basics

Signadyne P2P Products and Application Examples

Signadyne Record/Play Solutions



Storage Solution	PXIe Controller HDD (Rotational)	PXIe Controller HDD (SDD)	Signadyne PXIe P2P SSD Module	Signadyne Module's Onboard RAM
Max Storage Size	1 TB	1 TB	2 TB / slot	2 GB
Data BW			Requires Signadyne FPGA real-time processing for BW reduction	
16 GB/s				
1.6 GB/s				
200 MB/s				
20 MB/s				
Technology	DMA	DMA	P2P	Direct



Product Example: In-chassis SSD



In-chassis SSD storage module: SD HDD-H3344(F)

- High-capacity: from 120 GB to 2 TB
- Ultra high-performance SSD transfer rates
 - Up to 1600 MB/s read/write speed
- P2P operation mode with Signadyne modules
 - Up to 1600 MB/s using PXI Express/PCI Express Gen 2 x4
- High-endurance SSD
 - MTTF (Mean Time to Failure): 1,000,000 Hrs
 - TBW (Total Bytes Written), JEDEC Workload (JESD219A): Up to 6248 TB
- Up to 2 GB of onboard RAM
- Hardware programming:
 - Signadyne HVI Technology (all models):
 - Hardware real-time execution with a flowchart-style programming environment
 - Onboard user-programmable FPGA (F model):
 - Xilinx Kintex-7 325T/410T FPGA
- Mechanical/Interface:
 - 1 slot 3U (PXIe)
 - Up to 1.6 GB/s transfer BW with P2P capabilities (PCIe Gen 2)
 - Independent DMA channels for fast and efficient data transfer



Product Example: AWG



Arbitrary Waveform Generator: SD AWG-H3354(F)

- 4 output channels
 - 500 MS/s, 16 bits, 200 MHz per channel
- Embedded advanced AWGs:
 - Advanced triggering and marking
 - Waveform queue system with cycles, delays and prescalers
- Embedded high-precision function generators:
 - 45-bit frequency resolution (~ 5.68 μ Hz)
 - 24-bit phase resolution (~ 21.5 μ deg)
- Embedded ultra-flexible angle/amplitude modulators:
 - Modulations: AM, FM, PM, ASK, FSK, PSK, etc.
 - Simultaneous amplitude and angle modulations
- High-quality output signal with low phase noise:
 - SFDR: down to ~70dBc@120MHz
 - Average Noise Density: down to ~ -144 dBm/Hz
- Up to 2 GB of onboard RAM
- Hardware programming:
 - Signadyne HVI Technology (all models):
 - Hardware real-time execution with a flowchart-style programming environment
 - Onboard user-programmable FPGA (F model):
 - Xilinx Kintex-7 325T/410T FPGA
- Mechanical/Interface:
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Product Example: Digitizer

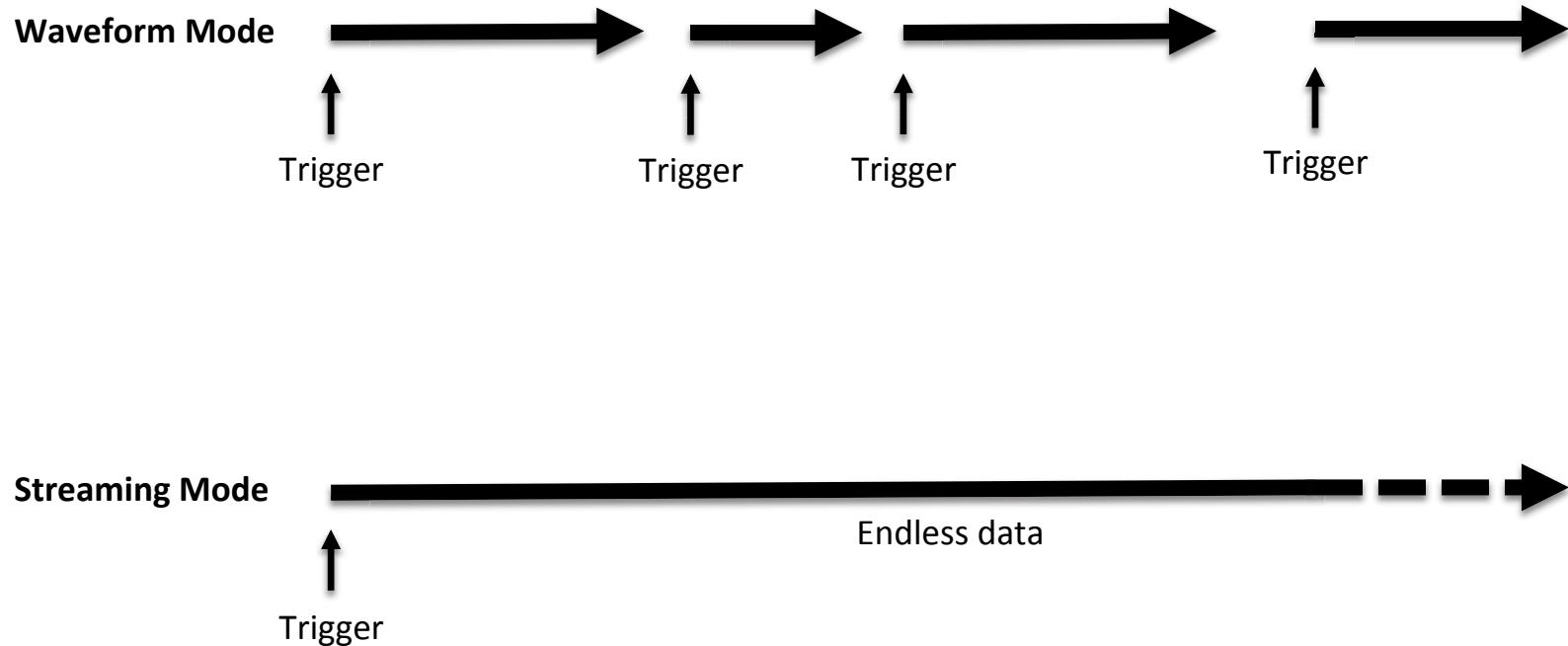


Digitizer: SD DIG-H3334(F)

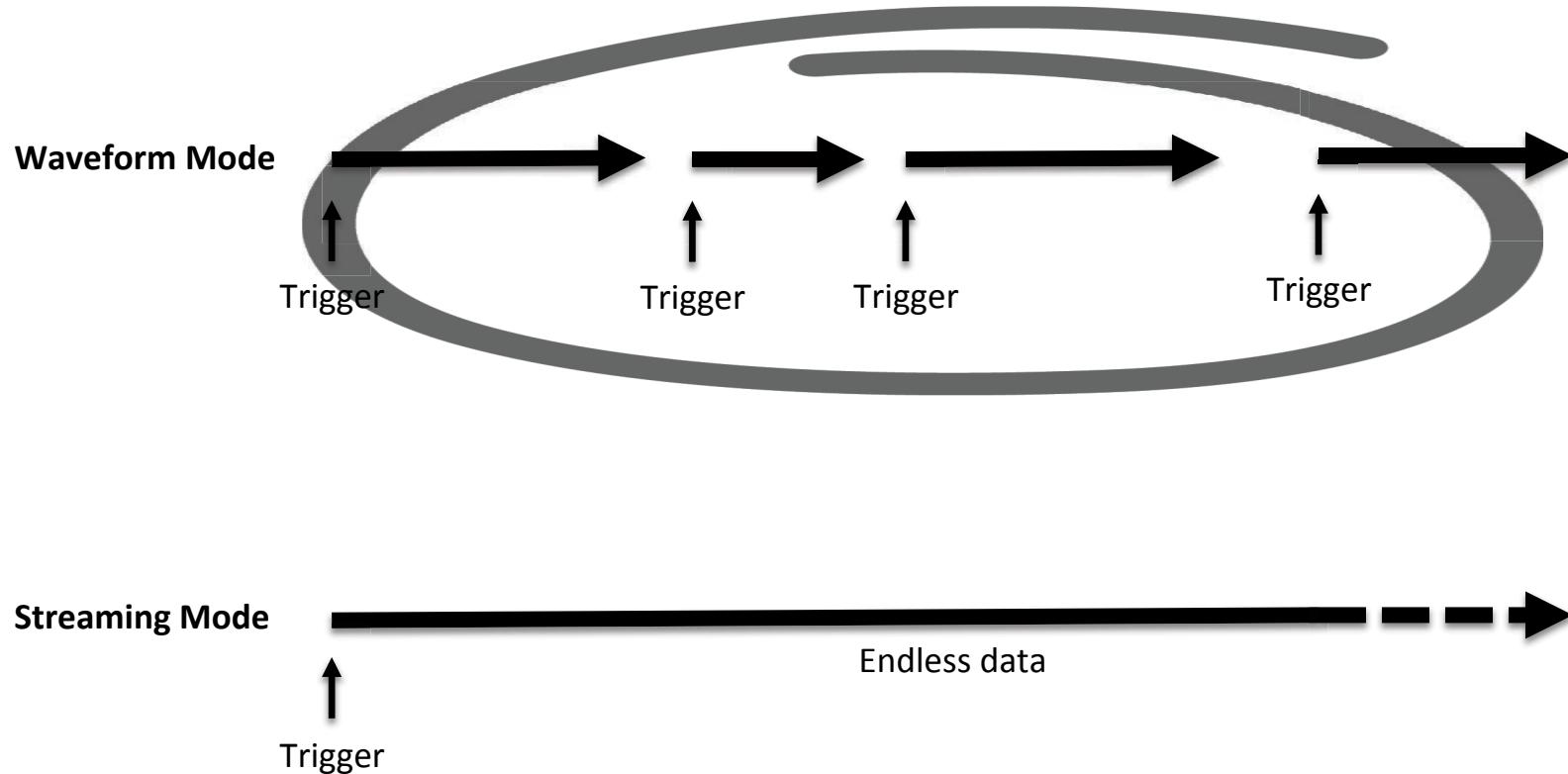
- 4 input channels
 - 500 MS/s, 14 bits, 500 MHz simultaneous sampling
- Advanced Data Acquisition system (DAQ):
 - Flexible triggering (HW trigger, HVI trigger, SW trigger)
 - Programmable cycles and data bursts to avoid PC saturation
- Up to 2 GB of onboard RAM
- Hardware programming:
 - Signadyne HVI Technology (all models):
 - Hardware real-time execution with a flowchart-style programming environment
 - Onboard user-programmable FPGA (F model):
 - Xilinx Kintex-7 325T/410T FPGA
- Mechanical/Interface:
 - 1 slot 3U (PXle)
 - Up to 1.6 GB/s transfer BW with P2P capabilities (PCIe Gen 2)
 - Independent DMA channels for fast and efficient data transfer



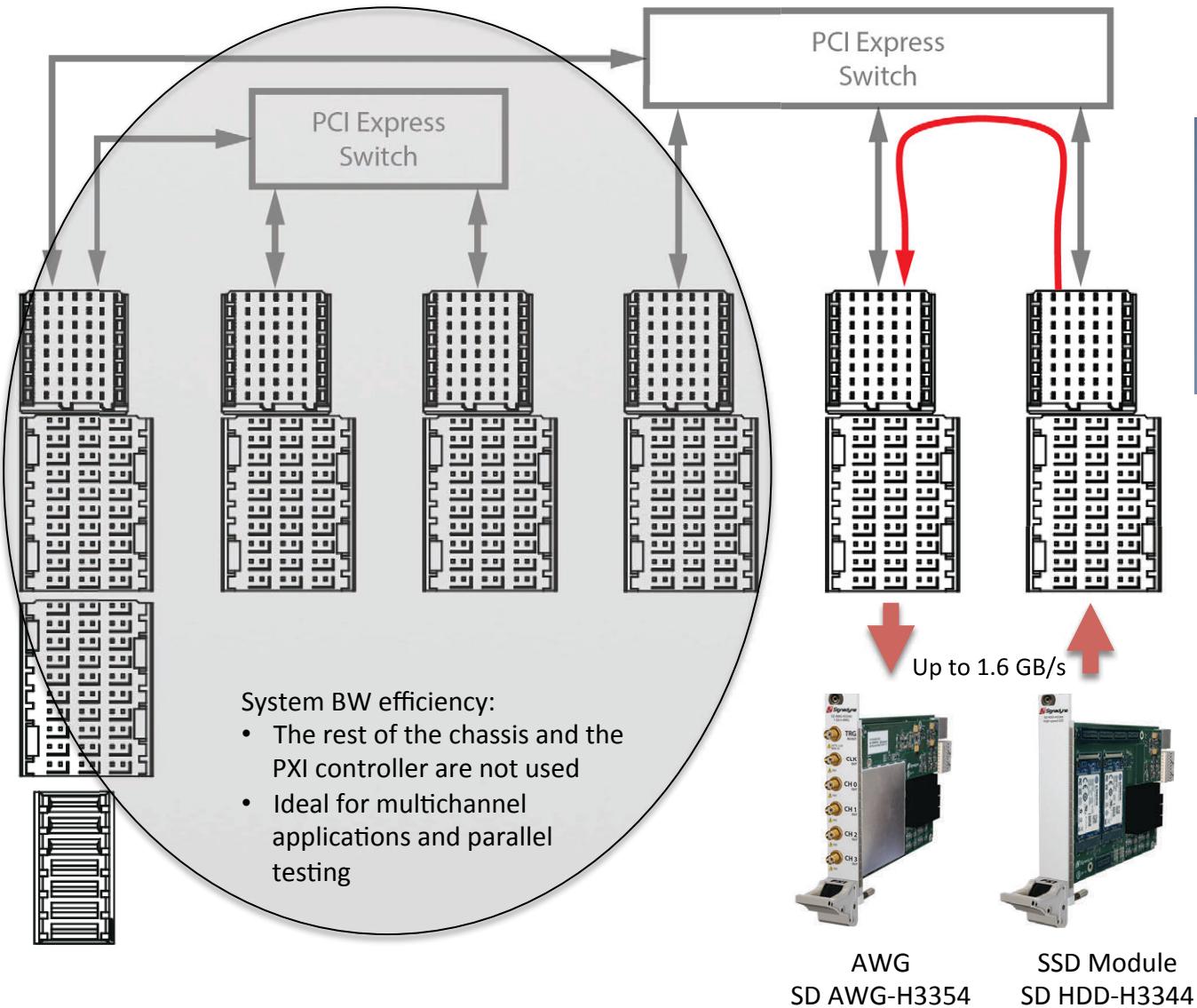
P2P Streaming vs Waveform Mode



P2P Streaming vs Waveform Mode



Signadyne P2P Play Example

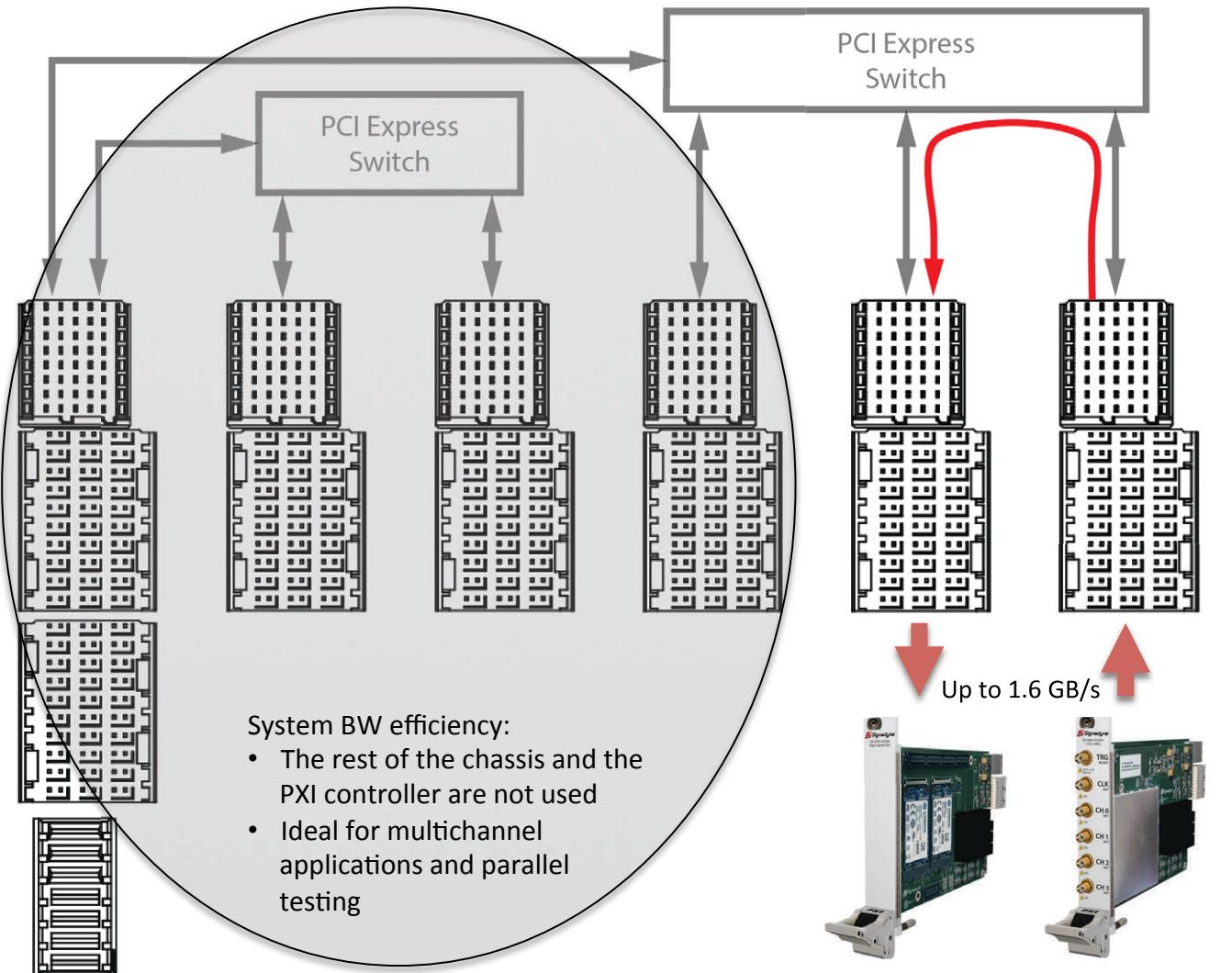


Application example:
Real World Signal Playback



The SSD module virtually extends the AWG's onboard RAM for waveforms

Signadyne P2P Record Example

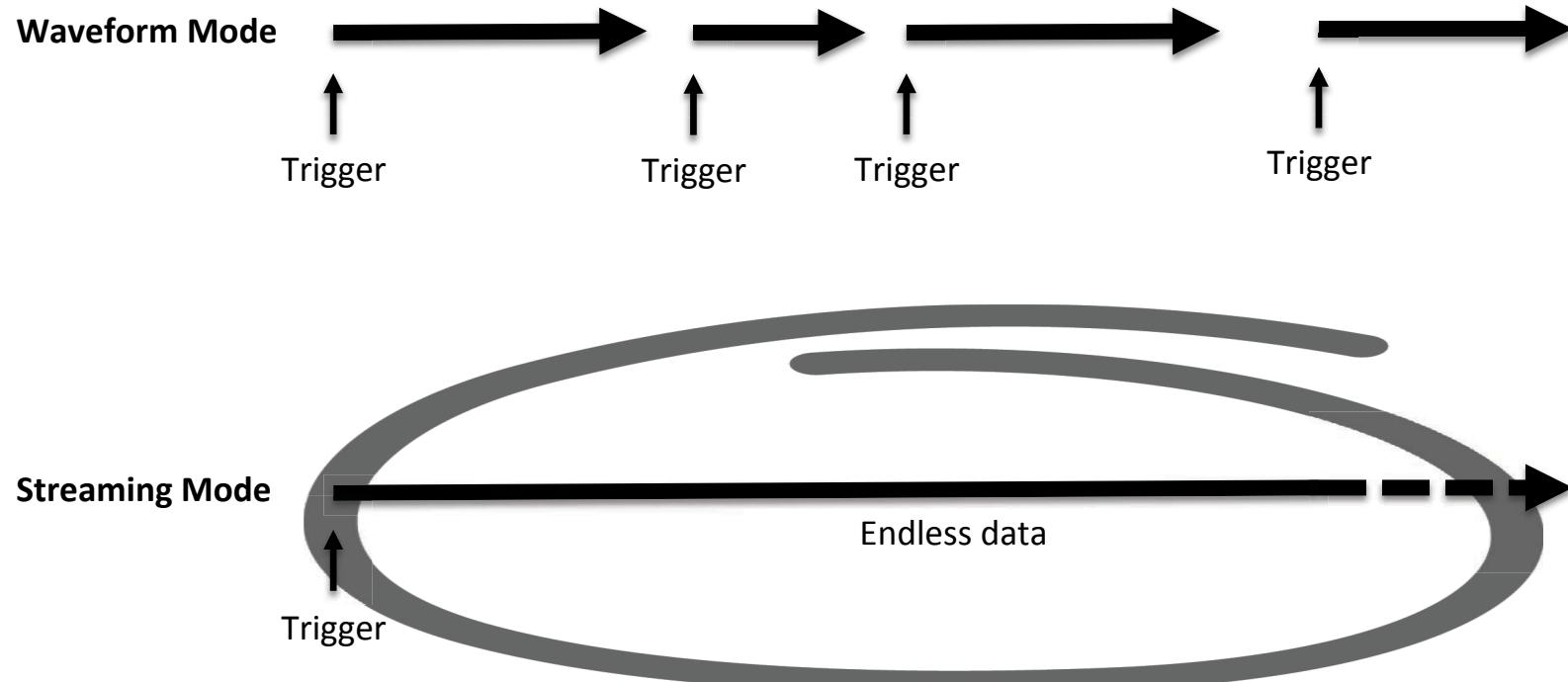


Application example:
Radar Signal Recording

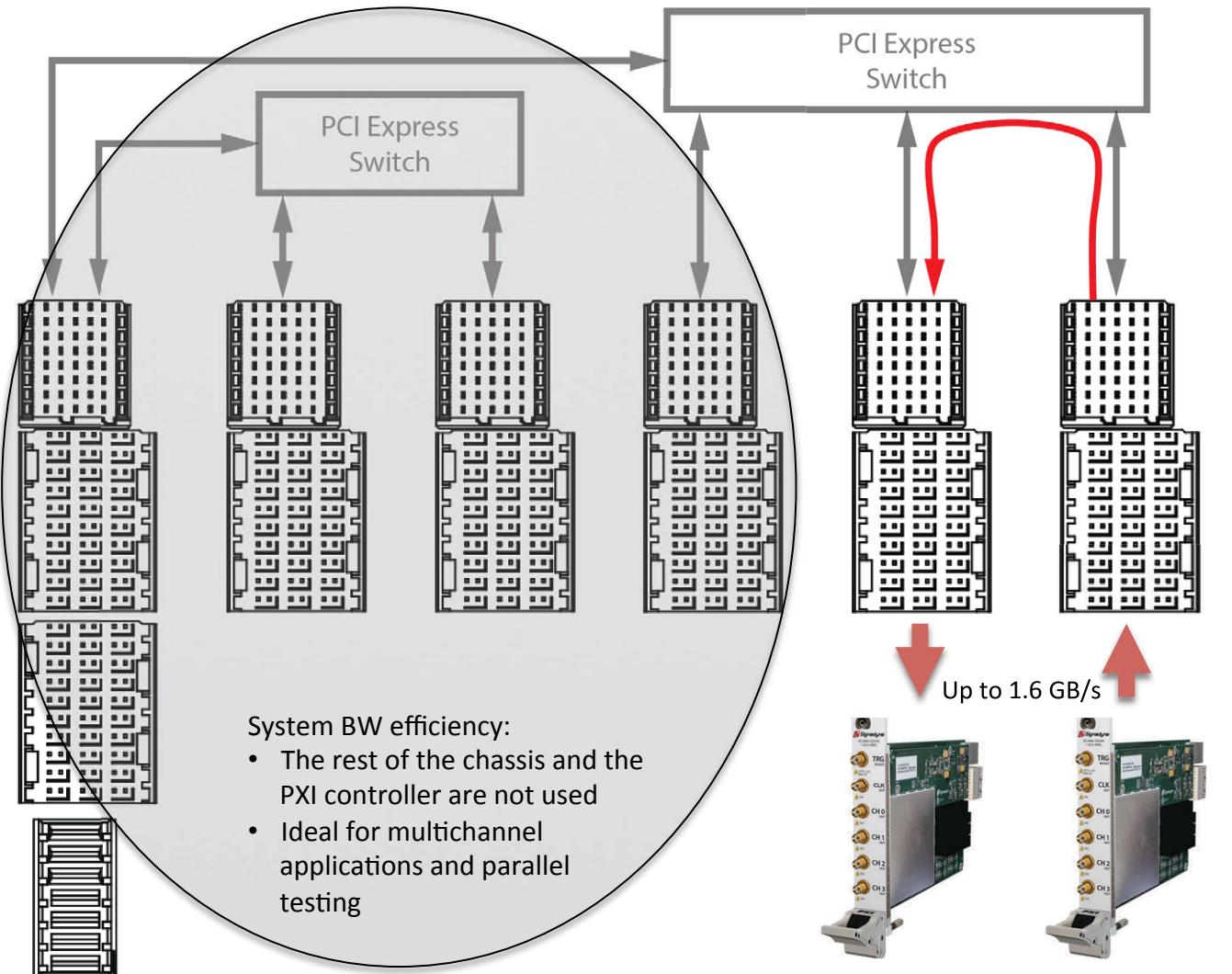


SSD Module
SD HDD-H3344 Digitizer
SD DIG-H3334

P2P Streaming vs Waveform Mode



Signadyne P2P Transceiver Example



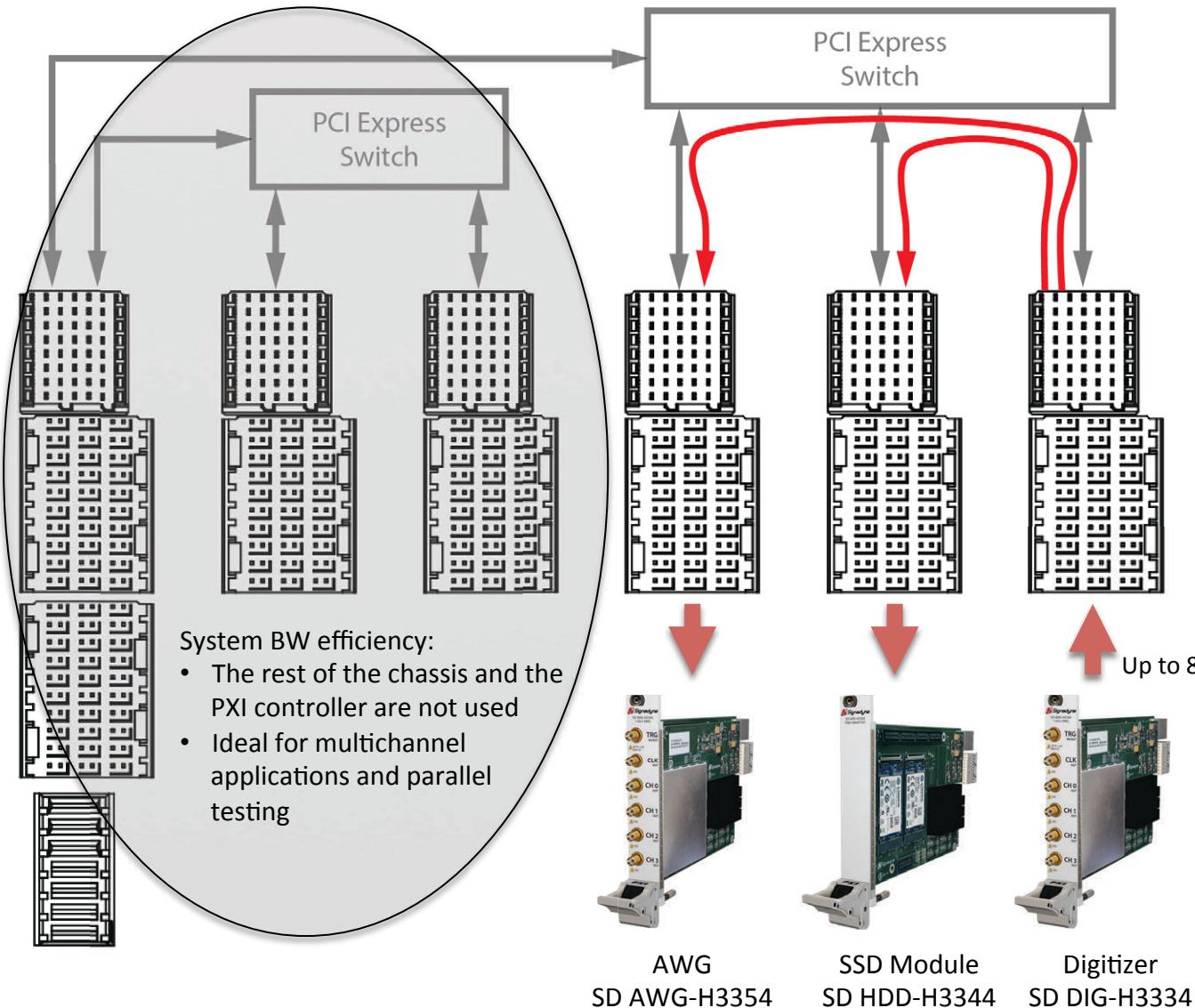
Application example:
RF Amplifier Test



AWG
SD AWG-H3354

Digitizer
SD DIG-H3334

Signadyne P2P Record & Playback Example



Application example:
MIMO Record & Playback



High-performance,
small-footprint
solution:

- Up to 20 transceivers in a 18-slot chassis, with up to 10 TB storage

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