

# DTA-5000

## 10 GIGABIT RECORD & PLAYBACK SYSTEM

DTA-5000 is an extremely scalable and ultra-fast 10 Gigabit record and playback system. It is designed to work with D-TA sensor signal acquisition products that are 10 Gigabit (10GbE) network attached. The DTA-5000 can also work with third-party products that provide a 10 GbE UDP/IP network for data transfer. The DTA-5000 includes a Multi-Core server, a 10 Gigabit Network Interface Card (NIC) and 16 high-reliability SAS disk drives. Each disk has either 300 GByte or 600 GByte capacity. The total capacity, therefore, is either 4.8 or 9.6 Terabytes. The record/playback design is based on highly optimized multi-threaded software operating under Linux OS with real-time patch.

The sustained record/playback rate per DTA-5000 (per 10 GbE network) is over 800 MBytes/s. Multiple DTA-5000 systems can be used with multiple 10 GbE networks to linearly increase the throughput rate. The DTA-5000 is packaged with D-TA products to offer a complete record and playback solution for radio/radar and sonar/acoustic applications. The 10Gx series products (where x denotes the number of 10 GbE networks, x=1, 2 or 4) comes with a comprehensive GUI or optional control API for fail-safe operation.

[\[Download Tech Notes TN-11, TN-18 and TN-25 for more information on D-TA's Record & Playback solution\]](#)



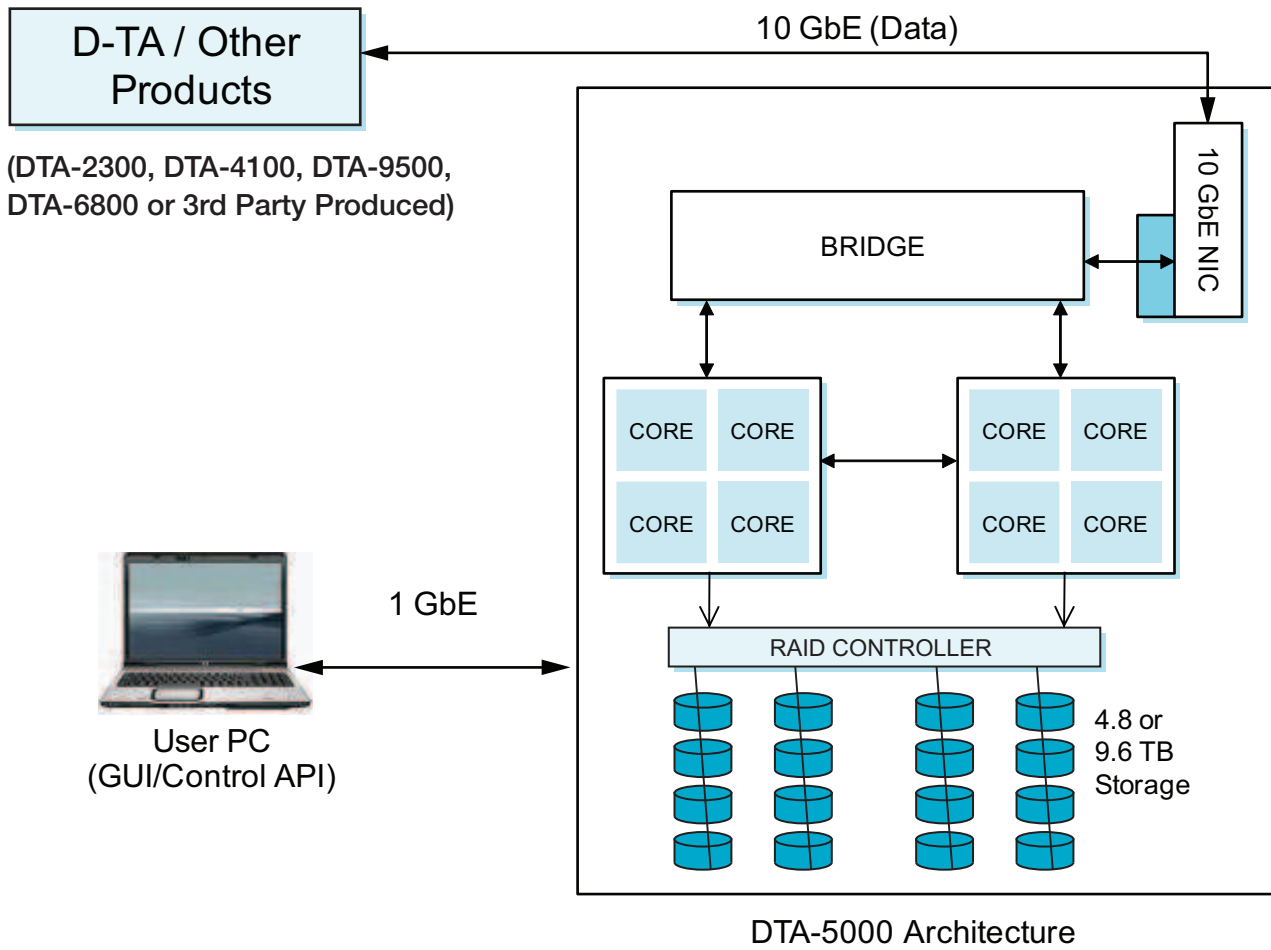
DTA-5000 [3U(H) X 19"(W) X 26"(D)]

### AT A GLANCE

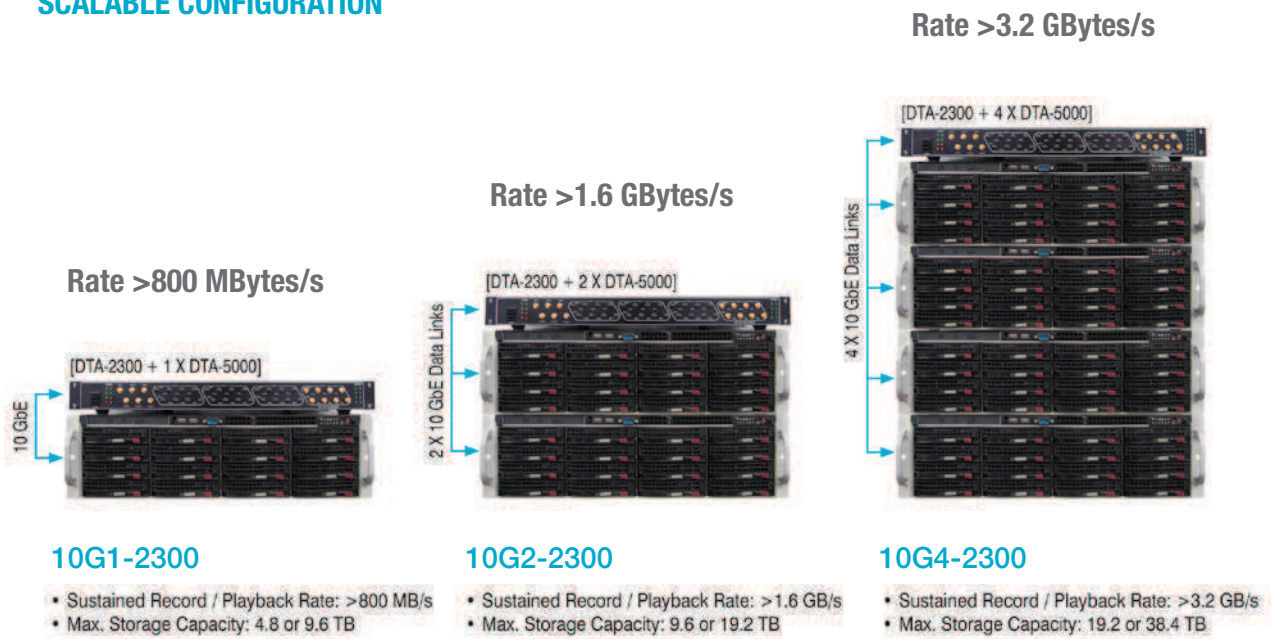
- System Based on Commercially Available RAID Storage System With Up To 16 High-Reliability SAS Drives
- Storage Capacity Up To 9.6 Terabytes
- Real-Time Multi-Core Software Based Design
- Record & Playback At Rates Over 800 MBytes/s Per 10 Gigabit Network & DTA-5000
- Scales Linearly As More Networks And DTA-5000 Systems are Added
- Synchronized Operation Across Multiple Networks Packaged with D-TA Radio & Acoustic Products (10Gx Series) to Offer Complete Record / Playback Solution (3rd Party Products with 10 GbE UDP/IP Network can also be supported)
- Comprehensive GUI or Control API for Failsafe Operation for the 10 Gx Series Products
- A Rugged Version DTA-5000R is also Available

### APPLICATIONS

- Phase-Coherent Recording / Playback of Wide-band Radio & Radar signals with DTA-2300 or DTA-9500
- Multi-Channel Sonar / Acoustic Signal Recording / Playback With DTA-4100
- Arbitrary Waveform Generation for RF Test
- Scenario Generation
- Sonar / Acoustic Simulator & Stimulator



### SCALABLE CONFIGURATION



## 10 GIGABIT PACKET STRUCTURE

The 10G series record/playback systems that use one or more DTA-5000 system(s) with a D-TA sensor interface product(s) typically use a data packet structure with the following characteristics:

- UDP/IP with a IP datagram size close to 57,670 bytes
- Ethernet Jumbo frame (size close to 8266 bytes)
- Single source and single destination (destination is DTA-5000)
- Data parsing and IP-based data filtering are not used

The PACKET ID field in the header is incremented every packet and is an easy way to check data continuity. The other fields in the header allow users to read and process the data easily by storing all essential information as part of the data packet.

BITS [31:16]	BITS [15:0]
DTA MODEL NO	PACKET ID
TRIGGER COARSE TIME	
TRIGGER FINE TIME	
USER FIELD	OPERATING MODE
RESERVED	DATA FORMAT & NUMBER OF IP PER UDP
CH A NUMBER OF SAMPLES	CH B NUMBER OF SAMPLES
CH C NUMBER OF SAMPLES	CH D NUMBER OF SAMPLES
DATA (CH A)	DATA (CH A)
DATA (CH A)	DATA (CH A)
DATA (CH B)	DATA (CH B)
DATA (CH B)	DATA (CH B)
.....	.....

## GRAPHICAL USER INTERFACE (GUI)

The 10G series products come with a comprehensive and intuitive GUI that is designed for fail-safe operation. The GUI resides on the user's PC and allows easy control of all system components. The GUI provides status information, disk capacity and snapshots of Time or FFT displays for data quality check during record and playback. The recording can be stopped manually or continue for a programmed duration or size. Any selected run or portion of run can be played back. Pause and loop functionalities are supported.

### THE MAJOR GUI FEATURES ARE:

- Tabbed for ease of navigation and grouping of functions
- OS and system agnostic – Windows (XP, Windows 7), Linux, etc.
- Control of all system parameters (DTA-5000(s) and D-TA Sensor Interfacing and Processing Products)
- System status and disk status information
- Configuration can be saved in a file for future reload
- Record session management

- Programming record settings like session name, description, record by size, and record by duration
- Progress bar to indicate record/playback progress
- Time series or FFT snapshot display for data quality check during record or playback
- File transfer to remote storage device (over 1 GbE or 10 GbE link)

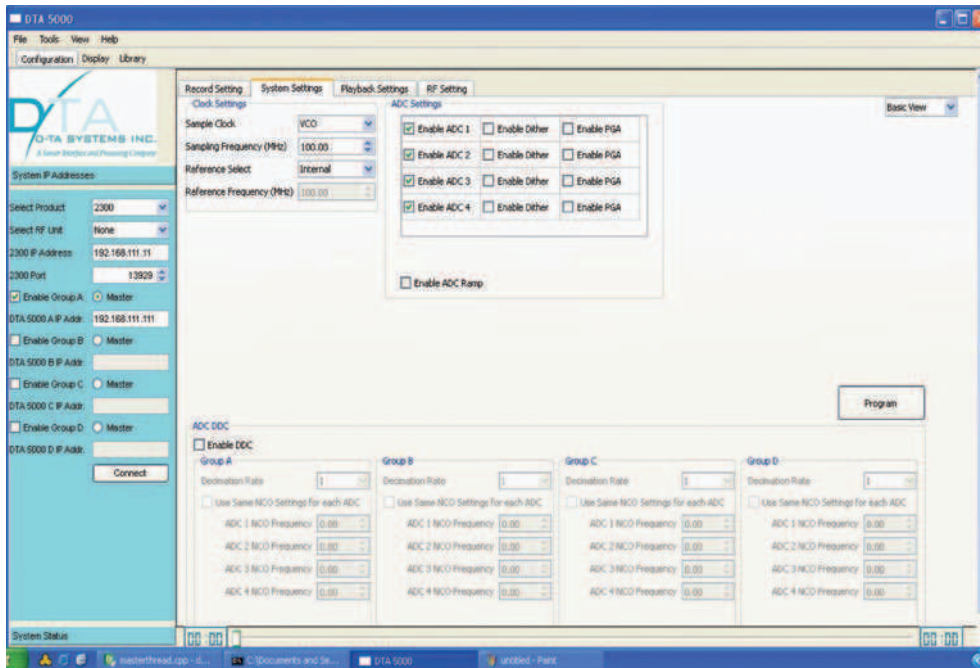
## FILE STRUCTURE

The data is recorded in an XFS file system for easy access by Windows or other operating systems. Each recording session is broken into multiple small files for quick network access. Each file includes a header that includes all information for identifying and processing data in the file. The header includes space for operator annotation. The list of recorded session is maintained in the library.

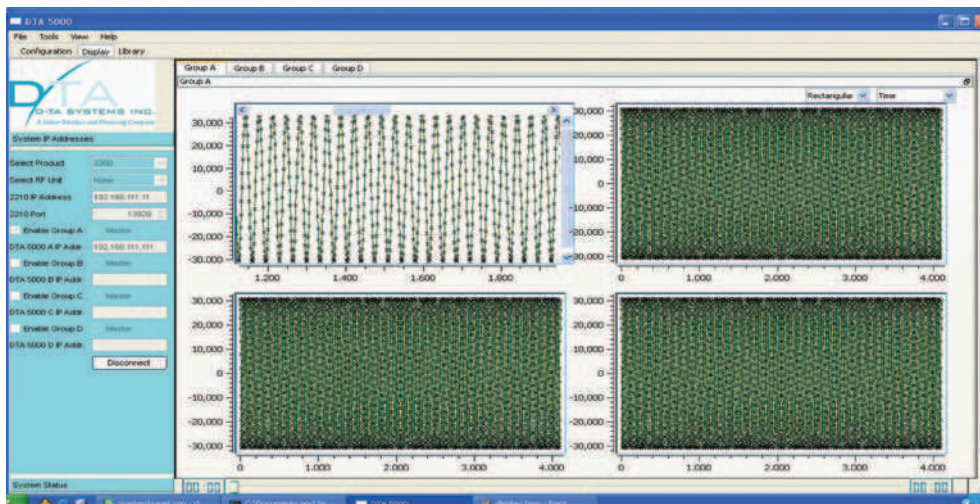
## FILE TRANSFER

The GUI offers a file transfer functionality that allows users to transfer a full or partial recording session over the 1 GbE network to a remote computer. For fast transfer, a 10 GbE network connection may be created by routing the 10 GbE record link to the user network.

## Configuration Screen (user PC) allows easy control of all systems



## Display Screen (user PC) provides snapshot displays of FFT/Time data during record/playback



### OPTIONAL CONTROL API

The DTA-5000 can be optionally provided with a C++ API that allows users to embed the control of the recorder in their applications and control the recorder from a remote device. The API is available for Windows 7, Windows XP or Linux. Sample API functions include `dtaAPI`: construct an API interface for DTA-5000; `dtaRecord`: initialize and prepare DTA-5000 for recording; `dtastopmodules`: stop recording; and `dtaGetDiskStatus`: retrieve disk quota status.

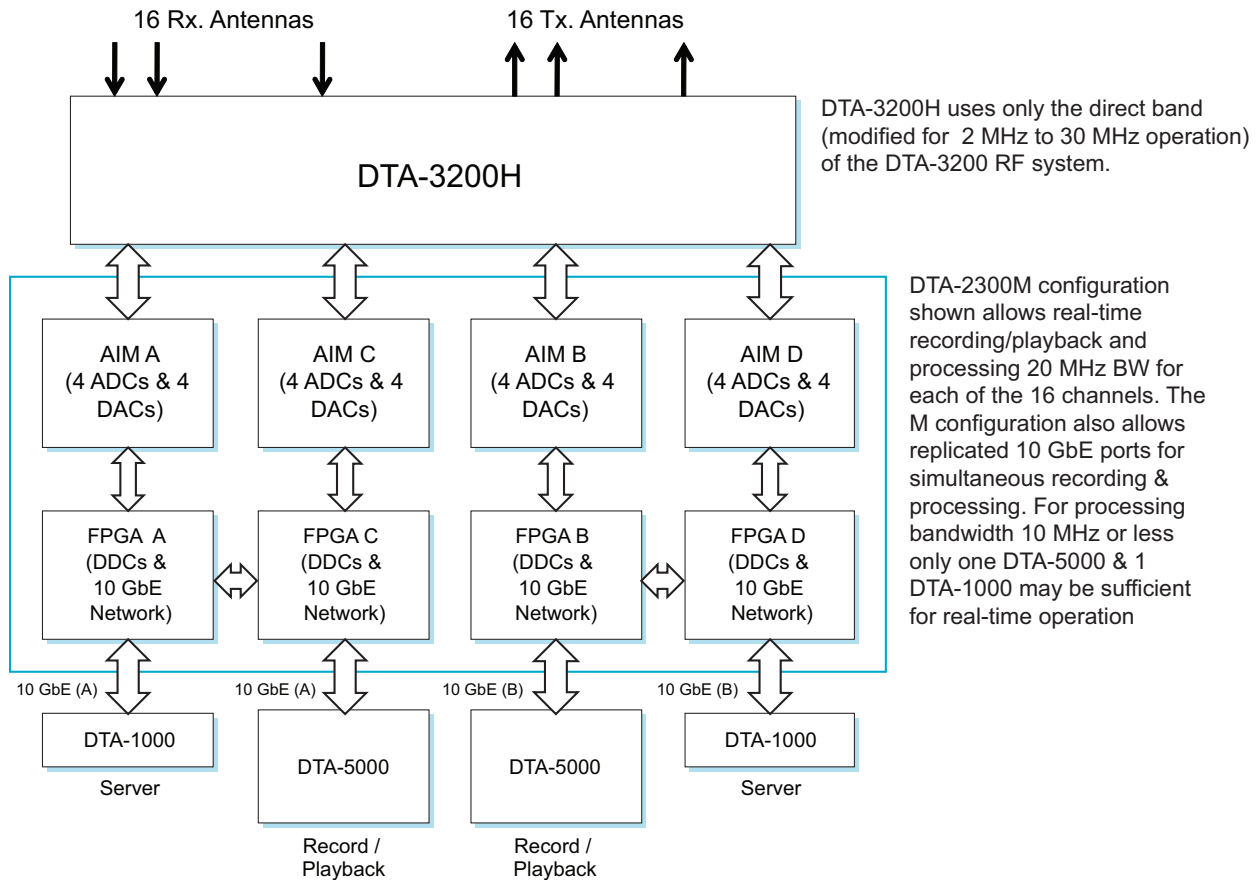
### PLAYING BACK COMPUTER-GENERATED DATA

Aside from playing back pre-recorded data files, DTA-5000 can also be used to play back computer-generated data for arbitrary waveform generation, simulation and test. An optional MATLAB data generation utility is available that allows the user to generate digital data and transfer the same to DTA-5000 for playback.

## ORDERING INFORMATION

PART NO.	DESCRIPTION	REMARKS
10G1- (Interface Product)	Record/Playback System with one 10 GbE Network and one DTA-5000 with 4.8 Terabyte total storage capacity	Interface Product: DTA-2300, DTA-4100 or DTA-9500. Record/Playback rate 800 MBytes/s.
10G1E- (Interface Product)	Record/Playback System with one (10 GbE Network and one DTA-5000 with 9.6 Terabyte total storage capacity	Record/Playback rate 800 MBytes/s
10G2- (Interface Product)	Record/Playback System with two 10 GbE Network and two DTA-5000s with 9.6 Terabyte total storage capacity	Record/Playback rate 1.6 GBytes/s
10G2E- (Interface Product)	Record/Playback System with two 10 GbE Network and two DTA-5000s with 19.2 Terabyte total storage capacity	Record/Playback rate 1.6 GBytes/s
10G4- (Interface Product)	Record/Playback System with four 10 GbE Network and four DTA-5000s with 19.2 Terabyte total storage capacity	Record/Playback rate 3.2 GBytes/s
10G4E- (Interface Product)	Record/Playback System with four 10 GbE Network and four DTA-5000s with 38.4 Terabyte total storage capacity	Record/Playback rate 3.2 GBytes/s

# MULTI-ANTENNA HF PROCESSING



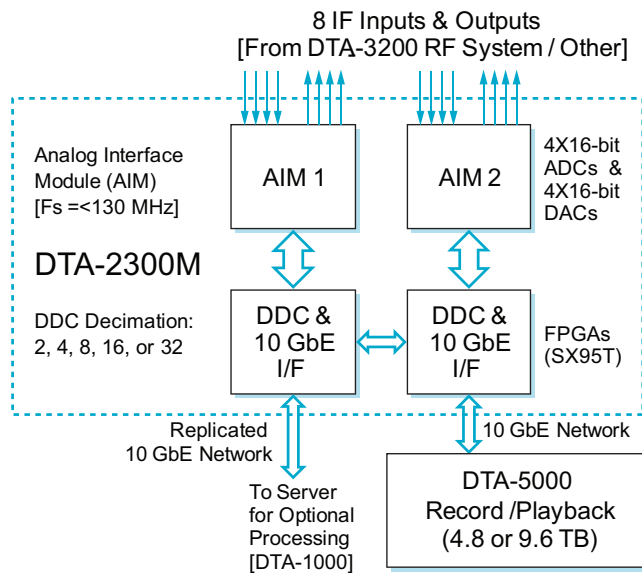
For many HF applications, including phased array radar, SIGINT/COMINT and direction finding, the above configuration offers a complete solution from HF signal conditioning to record/playback and processing. The 3200H system provides up to 16 receive and transmit channels in a 3U enclosure. The DTA-2300M configuration shown here

allows simultaneous processing and recording by offering replicated 10 Gigabit networks. For higher than 20 MHz real-time processing bandwidths, the DTA-2300S configuration can be used. For less than 10 MHz processing bandwidths, the Network Interface Card (NIC) inside the server or recorder can combine two 10 GbE data streams.

[\[Download Tech Note 19 for more information on HF processing\]](#)

# A LOW-COST, PHASE-COHERENT RECORD AND PLAYBACK SYSTEM FOR UP TO EIGHT WIDEBAND RADIO SIGNALS

A Low-Cost System for Phase-Coherent Record & Playback of Up to 8 Wideband Signals



The Record /Playback System in a rugged portable case with wheels and shock-mounted rack.

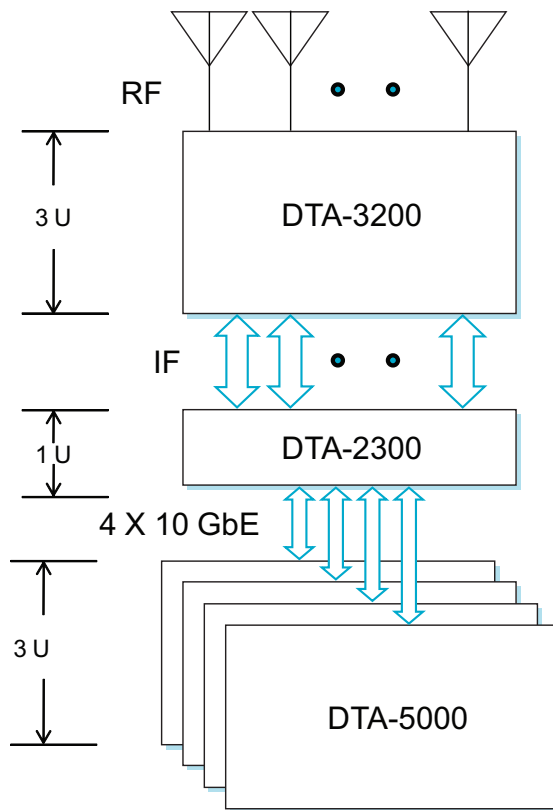
The DTA-2300M configuration provides replicated 10 Gigabit Networks for data, allowing processing using a server while recording. The sustained record/playback rate is 800 MBytes/s. Thus for four IFs, the DDC output rate ( $F_s/\text{decimation}$ ) for each IF can be 100 MHz (the corresponding BW is 40 MHz); for eight IFs, the output rate is 50 MHz for each IF (the corresponding BW is 20 MHz).

The processing bandwidth or the channel count can be increased by doubling the DTA-2300 configuration to 16 channels and using two 10 GbE fibers and two DTA-5000 systems.

The DTA-2300M standard configuration for eight IFs offers 16-bit ADCs and DACs and sample rates up to 130 MHz/channel. A DDC (Digital Down Converter) with programmable decimation (from 2 to 32) for each ADC channel allows programmable selection of bandwidth. The output of the DDC is complex (I & Q) baseband data. The DDC can also be bypassed to store real data. The output data can be real or up-converted to a complex IF signal using the DUC (Digital Up Converter) built in the DACs.

[\[Download Tech Note TN-18 for more information on this configuration\]](#)

# A COMPLETE MULTI-ANTENNA SOFTWARE RADIO TRANSCEIVER



## RF /IF System

- 20 MHz – 6 GHz Freq. Coverage
- 8 Rx & 8 Tx or 16 Rx/Tx Channels
- 40 MHz BW & 75 MHz IF

## IF/Baseband System

- 16 Rx & 16 Tx Channels
- 16 Bit ADCs & DACs, 130 MSPS
- DDC, DUC & 4X10 GbE Networks

## Record / Playback

- 800 MBytes/s per 10 GbE Fiber
- 9.6 Terabyte Storage per DTA5000
- Comprehensive GUI

From RF/IF to Record/Playback, D-TA products provide complete software radio solutions for multi-antenna applications that require fully synchronized phase-coherent operations. The DTA-3200 provides a wide frequency coverage and a tunable instantaneous bandwidth of 40 MHz. The DTA-2300 provides 16-bit digitization and DDC for each IF input. It also offers 16-bit DACs and DUCs for IF signal generation for RF up-conversion. The DTA-5000 offers a record/playback rate of over 800 MBytes/s per 10 Gigabit fiber. By using all four fibers and four DTA-5000 units, RF signals from 16 antennas with instantaneous BW of 40 MHz can be recorded or played back in real time.

## ARBITRARY WAVEFORM GENERATION

The above configuration can also be used for generating multiple phase-coherent arbitrary waveforms simulation, scenario generation or RF test. Computer-generated data can be recorded in DTA-5000 system(s) for playback through the DTA-2300 and DTA-3200 units.

[\[Download Tech Note TN-21 for more information on arbitrary waveform generation\]](#)