Low-Cost, Bus-Powered Multifunction DAQ for USB – 12- or 14-Bit, up to 48 kS/s, 8 Analog Inputs

NI USB-6008, NI USB-6009

- 8 analog inputs at 12 or 14 bits, up to 48 kS/s
- 2 analog outputs at 12 bits, software-timed
- 12 TTL/CMOS digital I/O lines
- 32-bit, 5 MHz counter
- Digital triggering
- Bus-powered
- 1-year warranty

Operating Systems

- Windows Vista (32- and 64-bit)/XP/2000
- Mac OS X[1]
- Linux®[1]
- Windows Mobile[1]
- Windows CE[1]

Recommended Software

- LabVIEW
- LabVIEW SignalExpress
- LabWindows™/CVI
- Measurement Studio

Other Compatible Software

- C#, Visual Basic .NET
- ANSI C/C++

Measurement Services Software (included)

- NI-DAQmx driver software
- Measurement & Automation Explorer configuration utility
- LabVIEW SignalExpress LE

[1]You need to download NI-DAQmx Base for these operating systems.

Product	Bus	Analog Inputs[1]	Input Resolution (bits)	Max Sampling Rate (kS/s)	Input Range (V)	Analog Outputs	Output Resolution (bits)	Output Rate (Hz)	Output Range (V)	Digital I/O Lines	32-Bit Counter	Trigger
USB-6009	USB	8 SE/4 DI	14	48	±1 to ±20	2	12	150	0 to 5	12	1	Digital
USB-6008	USB	8 SE/4 DI	12	10	±1 to ±20	2	12	150	0 to 5	12	1	Digital

[1]SE = single ended, DI = differential [2]Software-timed

Overview and Applications

With recent bandwidth improvements and new innovations from National Instruments, USB has evolved into a core bus of choice for measurement applications. The NI USB-6008 and USB-6009 are low-cost entry points to NI flagship data acquisition (DAQ) devices. With plug-and-play USB connectivity, these modules are simple enough for quick measurements but versatile enough for more complex measurement applications.

The USB-6008 and USB-6009 are ideal for a number of applications where low cost, small form factor, and simplicity are essential. Examples include:

- Data logging – quick and easy environmental or voltage data logging
- Academic lab use – student ownership of DAQ hardware for completely interactive lab-based courses (Academic pricing available. Visit **ni.com/academic** for details.)
- OEM applications as I/O for embedded systems

Recommended Software

National Instruments measurement services software, built around NI-DAQmx driver software, includes intuitive application programming interfaces, configuration tools, I/O assistants, and other tools designed to reduce system setup, configuration, and development time. National Instruments recommends using the latest version of NI-DAQmx driver software for application development in NI LabVIEW, LabVIEW SignalExpress, LabWindows/CVI, and Measurement Studio software. To obtain the latest version of NI-DAQmx, visit **ni.com/support/daq/versions**.

NI measurement services software speeds up your development with features including:

- A guide to create fast and accurate measurements with no programming using the DAQ Assistant.
- Automatic code generation to create your application in LabVIEW.
- LabWindows/CVI; LabVIEW SignalExpress; and C#, Visual Studio .NET, ANSI C/C++, or Visual Basic using Measurement Studio.
- Multithreaded streaming technology for 1,000 times performance improvements.
- Automatic timing, triggering, and synchronization routing to make advanced applications easy.
- More than 3,000 free software downloads available at **ni.com/zone** to jump-start your project.
- Software configuration of all digital I/O features without hardware switches/jumpers.
- Single programming interface for analog input, analog output, digital I/O, and counters on hundreds of multifunction DAQ hardware devices. M Series devices are compatible with the following versions (or later) of NI application software – LabVIEW, LabWindows/CVI, or Measurement Studio versions 7.x; and LabVIEW SignalExpress 2.x.

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Every M Series data acquisition device also includes a copy of LabVIEW SignalExpress LE data-logging software, so you can quickly acquire, analyze, and present data without programming. The NI-DAQmx Base driver software is provided for use with Linux, Mac OS X, Windows Mobile, and Windows CE operating systems.

Recommended Accessories

The USB-6008 and USB-6009 have removable screw terminals for easy signal connectivity. For extra flexibility when handling multiple wiring configurations, NI offers the USB-600x Connectivity Kit, which includes two extra sets of screw terminals, extra labels, and a screwdriver.

In addition, the USB-600x Prototyping Kit provides space for adding more circuitry to the inputs of the USB-6008 or USB-6009.

NI USB DAQ for OEMs

Shorten your time to market by integrating world-class National Instruments OEM measurement products into your embedded system design. Board-only versions of NI USB DAQ devices are available for OEM applications, with competitive quantity pricing and available software customization. The NI OEM Elite Program offers free 30-day trial kits for qualified customers. Visit **ni.com/oem** for more information.

Information for Student Ownership

To supplement simulation, measurement, and automation theory courses with practical experiments, NI has developed the USB-6008 and USB-6009 student kits, which include the LabVIEW Student Edition and a ready-to-run data logger application. These kits are exclusively for students, giving them a powerful, low-cost, hands-on learning tool. Visit **ni.com/academic** for more details.

Information for OEM Customers

For information on special configurations and pricing, call (800) 813 3693 (U.S. only) or visit **ni.com/oem**. Go to the Ordering Information section for part numbers.

Ordering Information

NI USB-6008[1]	779051-01
NI USB-6009[1]	779026-01
NI USB-6008 OEM	193132-02
NI USB-6009 OEM	193132-01
NI USB-6008 Student Kit[1,2]	779320-22
NI USB-6009 Student Kit[1,2]	779321-22
NI USB-600x Connectivity Kit	779371-01
NI USB-600x Prototyping Kit	779511-01

[1] Includes NI-DAQmx software, LabVIEW SignalExpress LE, and a USB cable.

[2] Includes LabVIEW Student Edition.

BUY NOW!

For complete product specifications, pricing, and accessory information, call 800 813 3693 (U.S. only) or go to **ni.com/usb**.

Specifications

Typical at 25 °C unless otherwise noted.

Analog Input

Absolute accuracy, single-ended

Range	Typical at 25 °C (mV)	Maximum (0 to 55 °C) (mV)
±10	14.7	138

Absolute accuracy at full scale, differential[1]

Range	Typical at 25 °C (mV)	Maximum (0 to 55 °C) (mV)
±20	14.7	138
±10	7.73	84.8
±5	4.28	58.4
±4	3.59	53.1
±2.5	2.56	45.1
±2	2.21	42.5
±1.25	1.70	38.9
±1	1.53	37.5

Number of channels ..... 8 single-ended/4 differential
Type of ADC ..... Successive approximation

ADC resolution (bits)

Module	Differential	Single-Ended
USB-6008	12	11
USB-6009	14	13

Maximum sampling rate (system dependent)

Module	Maximum Sampling Rate (kS/s)
USB-6008	10
USB-6009	48

Input range, single-ended ..... ±10 V
Input range, differential ..... ±20, ±10, ±5, ±4, ±2.5, ±2, ±1.25, ±1 V
Maximum working voltage ..... ±10 V
Overvoltage protection ..... ±35 V
FIFO buffer size ..... 512 B
Timing resolution ..... 41.67 ns (24 MHz timebase)
Timing accuracy ..... 100 ppm of actual sample rate
Input impedance ..... 144 kΩ
Trigger source ..... Software or external digital trigger
System noise ..... 5 m V_{rms} (±10 V range)

Analog Output

Absolute accuracy (no load) ..... 7 mV typical, 36.4 mV maximum at full scale
Number of channels 2
Type of DAC ..... Successive approximation
DAC resolution ..... 12 bits
Maximum update rate ..... 150 Hz, software-timed
Output range ..... 0 to +5 V
Output impedance ..... 50 Ω
Output current drive ..... 5 mA
Power-on state ..... 0 V
Slew rate ..... 1 V/µs
Short-circuit current ..... 50 mA

Digital I/O

Number of channels ..... 12 total
8 (P0.<0..7>)
4 (P1.<0..3>)
Direction control ..... Each channel individually programmable as input or output
Output driver type
USB-6008 ..... Open-drain
USB-6009 ..... Each channel individually programmable as push-pull or open-drain
Compatibility ..... CMOS, TTL, LVTTL
Internal pull-up resistor ..... 4.7 kΩ to +5 V
Power-on state ..... Input (high impedance)
Absolute maximum voltage range ..... -0.5 to +5.8 V

Digital logic levels

Level	Min	Max	Units
Input low voltage	-0.3	0.8	V
Input high voltage	2.0	5.8	V
Input leakage current	–	50	µA
Output low voltage (I = 8.5 mA)	–	0.8	V
Output high voltage (push-pull, I = -8.5 mA)	2.0	3.5	V
Output high voltage (open-drain, I = -0.6 mA, nominal)	2.0	5.0	V
Output high voltage (open-drain, I = -8.5 mA, with external pull-up resistor)	2.0	–	V

Counter

Number of counters 1
Resolution ..... 32 bits
Counter measurements ..... Edge counting (falling edge)
Pull-up resistor ..... 4.7 kΩ to 5 V
Maximum input frequency ..... 5 MHz
Minimum high pulse width ..... 100 ns
Minimum low pulse width ..... 100 ns
Input high voltage ..... 2.0 V
Input low voltage ..... 0.8 V

Power available at I/O connector

+5 V output (200 mA maximum) ..... +5 V typical
+4.85 V minimum
+2.5 V output (1 mA maximum) ..... +2.5 V typical
+2.5 V output accuracy ..... 0.25% max
Voltage reference temperature drift ..... 50 ppm/°C max

[1]Input voltages may not exceed the working voltage range.

Physical Characteristics

If you need to clean the module, wipe it with a dry towel.

Dimensions (without connectors)	6.35 by 8.51 by 2.31 cm (2.50 by 3.35 by 0.91 in.)
Dimensions (with connectors)	8.18 by 8.51 by 2.31 cm (3.22 by 3.35 by 0.91 in.)
Weight (without connectors)	59 g (2.1 oz)
Weight (with connectors)	84 g (3 oz)
I/O connectors	USB series B receptacle (2) 16-position (screw-terminal) plug headers
Screw-terminal wiring	16 to 28 AWG
Screw-terminal torque	0.22 to 0.25 N•m (2.0 to 2.2 lb•in.)

Power Requirement

USB (4.10 to 5.25 VDC)	80 mA typical 500 mA maximum
USB suspend	300 µA typical 500 µA maximum

Environmental

The USB-6008 and USB-6009 are intended for indoor use only.

Operating environment	
Ambient temperature range	0 to 55 °C (tested in accordance with IEC-60068-2-1 and IEC-60068-2-2)
Relative humidity range	10 to 90%, noncondensing (tested in accordance with IEC-60068-2-56)
Storage environment	
Ambient temperature range	-40 to 85 °C (tested in accordance with IEC-60068-2-1 and IEC-60068-2-2)
Relative humidity range	5 to 90%, noncondensing (tested in accordance with IEC-60068-2-56)
Maximum altitude	2,000 m (at 25 °C ambient temperature)
Pollution degree	2

Safety and Compliance

Safety

This product is designed to meet the requirements of the following standards of safety for electrical equipment for measurement, control, and laboratory use:

- IEC 61010-1, EN 61010-1
- UL 61010-1, CSA 61010-1

Note: For UL and other safety certifications, refer to the product label or visit **ni.com/certification**, search by model number or product line, and click the appropriate link in the Certification column.

Electromagnetic Compatibility

This product is designed to meet the requirements of the following standards of EMC for electrical equipment for measurement, control, and laboratory use:

- EN 61326 EMC requirements; Minimum Immunity
- EN 55011 Emissions; Group 1, Class A
- CE, C-Tick, ICES, and FCC Part 15 Emissions; Class A

Note: For EMC compliance, operate this device according to product documentation.

CE Compliance

This product meets the essential requirements of applicable European Directives, as amended for CE marking, as follows:

- 2006/95/EC; Low-Voltage Directive (safety)
- 2004/108/EC; Electromagnetic Compatibility Directive (EMC)

Note: Refer to the Declaration of Conformity (DoC) for this product for any additional regulatory compliance information. To obtain the DoC for this product, visit **ni.com/certification**, search by model number or product line, and click the appropriate link in the Certification column.

Waste Electrical and Electronic Equipment (WEEE)

EU Customers: At the end of their life cycle, all products must be sent to a WEEE recycling center. For more information about WEEE recycling centers and National Instruments WEEE initiatives, visit **ni.com/environment/weee.htm**.

NI Services and Support

NI has the services and support to meet your needs around the globe and through the application life cycle – from planning and development through deployment and ongoing maintenance. We offer services and service levels to meet customer requirements in research, design, validation, and manufacturing. Visit **ni.com/services**.

Training and Certification

NI training is the fastest, most certain route to productivity with our products. NI training can shorten your learning curve, save development time, and reduce maintenance costs over the application life cycle. We schedule instructor-led courses in cities worldwide, or we can hold a course at your facility. We also offer a professional certification program that identifies individuals who have high levels of skill and knowledge on using NI products. Visit **ni.com/training**.

Professional Services

Our Professional Services Team is comprised of NI applications engineers, NI Consulting Services, and a worldwide National Instruments Alliance Partner program of more than 600 independent consultants and integrators. Services range from start-up assistance to turnkey system integration. Visit **ni.com/alliance**.

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OEM Support

We offer design-in consulting and product integration assistance if you want to use our products for OEM applications. For information about special pricing and services for OEM customers, visit **ni.com/oem**.

Local Sales and Technical Support

In offices worldwide, our staff is local to the country, giving you access to engineers who speak your language. NI delivers industry-leading technical support through online knowledge bases, our applications engineers, and access to 14,000 measurement and automation professionals within NI Developer Exchange forums. Find immediate answers to your questions at **ni.com/support**.

We also offer service programs that provide automatic upgrades to your application development environment and higher levels of technical support. Visit **ni.com/ssp**.

Hardware Services

NI Factory Installation Services

NI Factory Installation Services (FIS) is the fastest and easiest way to use your PXI or PXI/SCXI combination systems right out of the box. Trained NI technicians install the software and hardware and configure the system to your specifications. NI extends the standard warranty by one year on hardware components (controllers, chassis, modules) purchased with FIS. To use FIS, simply configure your system online with **ni.com/pxiadvisor**.

Calibration Services

NI recognizes the need to maintain properly calibrated devices for high-accuracy measurements. We provide manual calibration procedures, services to recalibrate your products, and automated calibration software specifically designed for use by metrology laboratories. Visit **ni.com/calibration**.

Repair and Extended Warranty

NI provides complete repair services for our products. Express repair and advance replacement services are also available. We offer extended warranties to help you meet project life-cycle requirements. Visit **ni.com/services**.

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Arrival Time Distribution PC12-Acces point

DISTRIBUTION Kolmogorov-Smirnov	APRIL 14	APRIL 17	APRIL 20	APRIL 21	APRIL 22	April 23	April 24	April 28	APRIL 29	MAY 14	MAY 15	MAY 18
Weibull(3P)	**α 0.02 0.01 0.05**	**α 0.2 0.1 0.02 0.01 0.05**	**α 0.2 0.1 0.02 0.01 0.05**	**α 0.02 0.01**	**α 0.2 0.1 0.02 0.01 0.05**	**α 0.2 0.1 0.02 0.01 0.05**	**α 0.2 0.1 0.02 0.01 0.05**	**α 0.2 0.1 0.02 0.01 0.05**	**α 0.2 0.1 0.02 0.01 0.05**	**α 0.2 0.1 0.02 0.01 0.05**	**α 0.2 0.1 0.02 0.01 0.05**	**α 0.2 0.1 0.02 0.01 0.05**
Lognormal(3P)	α 0.2 0.1 0.02 0.01 0.05	α 0.02 0.01	α 0.1 0.02 0.01 0.05	no match	no match	α 0.02 0.01	α 0.02 0.01	α 0.2 0.1 0.02 0.01 0.05	α 0.2 0.1 0.02 0.01 0.05	α 0.2 0.1 0.02 0.01 0.05	α 0.2 0.1 0.02 0.01 0.05	α 0.02 0.01
LogPearson3	***α 0.2 0.1 0.02 0.01 0.05***	***α 0.1 0.02 0.01 0.05***	***α 0.2 0.1 0.02 0.01 0.05***	***α 0.01***	***α 0.1 0.02 0.01 0.05***	***α 0.02 0.01 0.05***	***α 0.02 0.01 0.05***	***α 0.2 0.1 0.02 0.01 0.05***	***α 0.2 0.1 0.02 0.01 0.05***	***α 0.2 0.1 0.02 0.01 0.05***	***α 0.2 0.1 0.02 0.01 0.05***	***α 0.2 0.1 0.02 0.01 0.05***
Lognormal	α 0.2 0.1 0.02 0.01 0.05	α 0.02 0.01 0.05	α 0.1 0.02 0.01 0.05	no match	no match	α 0.02 0.01	α 0.02 0.01	α 0.2 0.1 0.02 0.01 0.05	α 0.2 0.1 0.02 0.01 0.05	α 0.2 0.1 0.02 0.01 0.05	α 0.2 0.1 0.02 0.01 0.05	α 0.02 0.01

Arrival Time Distribution PC12-Acces point

LogLogistic(3P)	***α 0.2 0.1 0.02 0.01 0.05***	***α 0.1 0.02 0.01 0.05***	***α 0.02 0.01 0.05***	***no match***	***α 0.1 0.02 0.01 0.05***	***α 0.2 0.1 0.02 0.01 0.05***	***α 0.2 0.1 0.02 0.01 0.05***	***α 0.2 0.1 0.02 0.01 0.05***	***α 0.2 0.1 0.02 0.01 0.05***	***α 0.2 0.1 0.02 0.01 0.05***	***α 0.1 0.02 0.01 0.05***	***α 0.1 0.02 0.01 0.05***
Weibull	***α 0.02 0.01***	***α 0.2 0.1 0.02 0.01 0.05***	***α 0.2 0.1 0.02 0.01 0.05***	***α 0.02 0.01 0.05***	***α 0.2 0.1 0.02 0.01 0.05***	***α 0.2 0.1 0.02 0.01 0.05***	***α 0.2 0.1 0.02 0.01 0.05***	***α 0.2 0.1 0.02 0.01 0.05***	***(3p)***	***α 0.2 0.1 0.02 0.01 0.05***	***α 0.2 0.1 0.02 0.01 0.05***	***α 0.2 0.1 0.02 0.01 0.05***
Pearson6	***α 0.1 0.02 0.01 0.05***	***α 0.2 0.1 0.02 0.01 0.05***	***α 0.2 0.1 0.02 0.01 0.05***	***no match***	***α 0.2 0.1 0.02 0.01 0.05***	***α 0.2 0.1 0.02 0.01 0.05***	***α 0.2 0.1 0.02 0.01 0.05***	***α 0.01***	***α 0.2 0.1 0.02 0.01 0.05***	***α 0.2 0.1 0.02 0.01 0.05***	***α 0.01***	***No match***
Dagum	***α 0.2 0.1 0.02 0.01 0.05***	***α 0.01***	***α 0.2 0.1 0.02 0.01 0.05***	***No match***	***α 0.2 0.1 0.02 0.01 0.05***	***α 0.02 0.01***	***α 0.02 0.01***	***α 0.2 0.1 0.02 0.01 0.05***	***α 0.1 0.02 0.01 0.05***	***α 0.1 0.02 0.01 0.05***	***α 0.2 0.1 0.02 0.01 0.05***	***No match***
LogLogistic	α 0.2 0.1 0.02 0.01 0.05	α 0.02 0.01	α 0.1 0.02 0.01 0.05	no match	no match	α 0.02 0.01	α 0.02 0.01	α 0.2 0.1 0.02 0.01 0.05	α 0.2 0.1 0.02 0.01 0.05	α 0.2 0.1 0.02 0.01 0.05	α 0.2 0.1 0.02 0.01 0.05	α 0.02 0.01

Arrival Time Distribution PC12-Acces point

GenGamma(4P)	***no match***	***α 0.2 0.1 0.02 0.01 0.05***	***α 0.2 0.1 0.02 0.01 0.05***	***α 0.02 0.01 0.05***	***α 0.2 0.1 0.02 0.01 0.05***	***α 0.2 0.1 0.02 0.01 0.05***	***α 0.2 0.1 0.02 0.01 0.05***	***α 0.2 0.1 0.02 0.01 0.05***	***α 0.2 0.1 0.02 0.01 0.05***	***α 0.2 0.1 0.02 0.01 0.05-***	***α 0.2 0.1 0.02 0.01 0.05***	***α 0.2 0.1 0.02 0.01 0.05***
LogGamma	α 0.2 0.1 0.02 0.01 0.05	no match-	α 0.1 0.02	no match	No match	α 0.01	α 0.01	α 0.1 0.02 0.01 0.05	α 0.1 0.02 0.01 0.05	α 0.1 0.02 0.01 0.05	α 0.1 0.02 0.01 0.05	No match
Gamma(3p)	***no match***	***α 0.2 0.1 0.02 0.01 0.05***	***α 0.1 0.02 0.01 0.05***	***α 0.02 0.01 0.05***	***α 0.2 0.1 0.02 0.01 0.05***	***α 0.1 0.02 0.01 0.05***	***α 0.1 0.02 0.01 0.05***	***α 0.01***	***α 0.2 0.1 0.02 0.01 0.05***	***α 0.2 0.1 0.02 0.01 0.05***	***α 0.2 0.1 0.02 0.01 0.05***	***α 0.2 0.1 0.02 0.01 0.05***

Arrival Time Distributions PC12-PC7 link two devices Scenario.

DISTRIBUTION Kolmogorov-Smirnov	APRIL 16	APRIL 20	APRIL 20A	APRIL 21	APRIL 22	APRIL 22A	April 24	April 28	April 29	MAY 14	MAY 15	MAY 18
Weibull(3P)	***α 0.2 0.1 0.02 0.01 0.05***	***α 0.2 0.1 0.02 0.01 0.05***	***α 0.2 0.1 0.02 0.01 0.05***	***α 0.01***	***α 0.01***	***α 0.2 0.1 0.02 0.01 0.05***	***α 0.02 0.01 0.05***	***α 0.1 0.02 0.01 0.05***	***α 0.1 0.02 0.01 0.05***	***α 0.2 0.1 0.02 0.01 0.05***	---	***α 0.02 0.01 0.05***
Lognormal(3P)	α 0.2 0.1 0.02 0.01 0.05	---	α 0.2 0.1 0.02 0.01 0.05	---	α 0.2 0.1 0.02 0.01 0.05	α 0.1 0.02 0.01 0.05	α 0.2 0.1 0.02 0.01 0.05	α 0.02 0.01 0.05	α 0.01	α 0.2 0.1 0.02 0.01 0.05	---	---
Burr	α 0.2 0.1 0.02 0.01 0.05	α 0.2 0.1 0.02 0.01 0.05	α 0.2 0.1 0.02 0.01 0.05	α 0.02 0.01 0.05	α 0.02 0.01 0.05	α 0.2 0.1 0.02 0.01 0.05	α 0.2 0.1 0.02 0.01 0.05	α 0.2 0.1 0.02 0.01 0.05	---	α 0.2 0.1 0.02 0.01 0.05	———	---
LogPearson3	***α 0.2 0.1 0.02 0.01 0.05***	***α 0.2 0.1 0.02 0.01 0.05***	***α 0.2 0.1 0.02 0.01 0.05***	***α 0.02 0.01***	***α 0.2 0.1 0.02 0.01 0.05***	***α 0.2 0.1 0.02 0.01 0.05***	***α 0.2 0.1 0.02 0.01 0.05***	***α 0.2 0.1 0.02 0.01 0.05***	***α 0.1 0.02 0.01 0.05***	***α 0.2 0.1 0.02 0.01 0.05***	---	***α 0.02 0.01***

Arrival Time Distributions PC12-PC7 link two devices Scenario.

Lognormal	α 0.2 0.1 0.02 0.01 0.05	α 0.2 0.1 0.02 0.01 0.05	α 0.2 0.1 0.02 0.01 0.05	-------	α 0.2 0.1 0.02 0.01 0.05	α 0.1 0.02 0.01 0.05	α 0.1 0.02 0.01 0.05	α 0.1 0.02 0.01 0.05	0.02 0.01	α 0.2 0.1 0.02 0.01 0.05	---------	-------
LogLogistic(3P)	α 0.2 0.1 0.02 0.01 0.05	α 0.2 0.1 0.02 0.01 0.05	α 0.2 0.1 0.02 0.01 0.05	---------	α 0.2 0.1 0.02 0.01 0.05	α 0.2 0.1 0.02 0.01 0.05	α 0.2 0.1 0.02 0.01 0.05	α 0.1 0.02 0.01 0.05	α 0.02 0.01 0.05	α 0.2 0.1 0.02 0.01 0.05	----------	α 0.02 0.01
Weibull	***α 0.2 0.1 0.02 0.01 0.05***	***α 0.2 0.1 0.02 0.01 0.05***	***α 0.2 0.1 0.02 0.01 0.05***	***α 0.02 0.01 0.05***	-------	***α 0.2 0.1 0.02 0.01 0.05***	***α 0.1 0.02 0.01 0.05***	***α 0.2 0.1 0.02 0.01 0.05***	***α 0.2 0.1 0.02 0.01 0.05***	***α 0.2 0.1 0.02 0.01 0.05***	---------	***α 0.1 0.02 0.01 0.05***
Pearson6	α 0.2 0.1 0.02 0.01 0.05	α 0.2 0.1 0.02 0.01 0.05	α 0.2 0.1 0.02 0.01 0.05	α 0.02 0.01	α 0.02 0.01	α 0.2 0.1 0.02 0.01 0.05	α 0.02 0.01	α 0.2 0.1 0.02 0.01 0.05	---------	α 0.2 0.1 0.02 0.01 0.05	------	α 0.02 0.01 0.05

Arrival Time Distributions PC12-PC7 link two devices Scenario.

Dagum	α 0.2 0.1 0.02 0.01 0.05	α 0.2 0.1 0.02 0.01 0.05	α 0.2 0.1 0.02 0.01 0.05	α 0.01	α 0.2 0.1 0.02 0.01 0.05	α 0.2 0.1 0.02 0.01 0.05	α 0.2 0.1 0.02 0.01 0.05	α 0.2 0.1 0.02 0.01 0.05	----------	α 0.2 0.1 0.02 0.01 0.05	----------	α 0.02 0.01 0.05
LogLogistic	α 0.2 0.1 0.02 0.01 0.05	α 0.2 0.1 0.02 0.01 0.05	α 0.1 0.02 0.01 0.05	-------	α 0.1 0.02 0.01 0.05	α 0.1 0.02 0.01 0.05	α 0.02 0.01 0.05	α 0.02 0.01 0.05	α 0.01	α 0.2 0.1 0.02 0.01 0.05	--------	---------
GenGamma(4P)	α 0.1 0.02 0.01 0.05	α 0.2 0.1 0.02 0.01 0.05	α 0.2 0.1 0.02 0.01 0.05	α 0.1 0.02 0.01 0.05	--------	α 0.2 0.1 0.02 0.01 0.05	α 0.2 0.1 0.02 0.01 0.05	------	α 0.2 0.1 0.02 0.01 0.05	α 0.01	--------	α 0.2 0.1 0.02 0.01 0.05
LogGamma	α 0.1 0.02 0.01 0.05	α 0.2 0.1 0.02 0.01 0.05	--------	------	α 0.2 0.1 0.02 0.01 0.05	α 0.02 0.01	α 0.02 0.01	α 0.02 0.01	----------	α 0.1 0.02 0.01 0.05	----------	--------
Gamma(3p)	—————	α 0.01 0.05	α 0.2 0.1 0.02 0.01 0.05	α 0.2 0.1 0.02 0.01 0.05	------	α 0.2 0.1 0.02 0.01 0.05	------	-------	α 0.2 0.1 0.02 0.01 0.05	α 0.02 0.01	-------	α 0.2 0.1 0.02 0.01 0.05

Arrival Time distribution Parameters PC12-Access point.

Weibull(3P)	APRIL14 α=0.38025 β=39956.0 γ=18.0 **α** **0.02** **0.01** **0.05**	APRIL17 α=0.45649 β=1.0059E5 γ=51.0 **α** **0.2** **0.1** **0.02** **0.01** **0.05**	APRIL 20 α=0.3869 β=74606 γ=20.0 **α** **0.2** **0.1** **0.02** **0.01** **0.05**	APRIL 21 α=0.41186 β=96603.0 γ=80.0 **α** **0.02** **0.01**	APRIL 22 α=0.49748 β=1.1374E+5 γ=32.0 **α** **0.2** **0.1** **0.02** **0.01** **0.05**	APRIL 23 α=0.41211 β=81454.0 γ=52.0 **α** **0.2** **0.1** **0.02** **0.01** **0.05**
	April 24 α=0.41211 β=81454.0 γ=52.0 **α** **0.2** **0.1** **0.02** **0.01** **0.05**	April 28 α=0.38266 β=1.2006E+5 γ=168.0 **α** **0.2** **0.1** **0.02** **0.01** **0.05**	April 29 α=0.4090 β=1.4297E+5 γ=90.0 **α** **0.2** **0.1** **0.02** **0.01** **0.05**	May 14 α=0.40902 β=1.4297E+5 γ=90.0 **α** **0.2** **0.1** **0.02** **0.01** **0.05**	May 15 α=0.40731 β=1.2748E+5 γ=210 **α** **0.2** **0.1** **0.02** **0.01** **0.05**	May 18 α=0.50161 β=3.1493E+5 γ=232 **α** **0.2** **0.1** **0.02** **0.01** **0.05**

Weibull(2P)	APRIL14 α=0.41537 β=35516.0 **α** **0.02** **0.01**	APRIL17 α=0.45115 β=92945.0 **α** **0.2** **0.1** **0.02** **0.01** **0.05**	APRIL 20 α=0.3754 β=83498.0 **α** **0.2** **0.1** **0.02** **0.01** **0.05**	APRIL 21 α=0.39087 β=1.0327E+5 **α** **0.02** **0.01** **0.05**	APRIL 22 α=0.4596 β=1.1036E+5 **α** **0.2** **0.1** **0.02** **0.01** **0.05**	APRIL 23 α=0.39851 β=81729.0 **α** **0.2** **0.1** **0.02** **0.01** **0.05**
	April 24 α=0.39851 β=81729.0 **α** **0.2** **0.1** **0.02** **0.01** **0.05**	April 28 α=0.40637 β=1.2134E+5 **α** **0.2** **0.1** **0.02** **0.01** **0.05**	April 29 (no match)	May 14 α=0.41443 β=1.3195E+5 **α** **0.2** **0.1** **0.02** **0.01** **0.05**	May 15 α=0.3985 β=1.5845E+5 **α** **0.2** **0.1** **0.02** **0.01** **0.05**	May 18 α=0.41474 β=3.3146E+5 **α** **0.2** **0.1** **0.02** **0.01** **0.05**

Arrival Time Distributions Parameters PC12-PC7 of two devices Scenario

Weibull(3P)	*APRIL16* *α=0.42954* *β=30082.0* *γ=20.0* ***α*** ***0.2*** ***0.1*** ***0.02*** ***0.01*** ***0.05***	*APRIL20* *α=0.41075* *β=17828.0* *γ=18.0* ***α*** ***0.2*** ***0.1*** ***0.02*** ***0.01*** ***0.05***	*APRIL 20A* α=0.5201 β=57218.0 γ=30.0 **α** **0.2** **0.1** **0.02** **0.01** **0.05**	*APRIL 21* α=0.40476 β=33494.0 γ=19.0 **α** **0.01**	*APRIL 22* α=0.38957 β=14525.0 γ=19.0 **α** **0.01**	APRIL 22A α=0.51956 β=66082.0 γ=40.0 **α** **0.2** **0.1** **0.02** **0.01** **0.05**	*April 24* α=0.3528 β=40480.0 γ=19.0 **α** **0.02** **0.01** **0.05**	*April 28* α=0.33673 β=1.3801E+5 γ=80.0 ***α*** ***0.1*** ***0.02*** ***0.01*** ***0.05***	*April 29* α=0.43103 β=1.0916E+5 γ=121 ***α*** ***0.1*** ***0.02*** ***0.01*** ***0.05***
	May 14 α=0.39086 β=43495.0 γ=29.0 **α** **0.2** **0.1** **0.02** **0.01** **0.05**	May 15 α=0.27358 β=2065.6 γ=17.0 **α** **0.2** **0.1** **0.02** **0.01** **0.05**	May 18 α=0.37535 β=45146.0 γ=18.0 **α** **0.2** **0.1** **0.02** **0.01** **0.05**						

Arrival Time Distributions Parameters PC12-PC7 of two devices Scenario

Weibull	*APRIL16* α=0.48743 β=29386.0 **α** **0.02** **0.01**	*APRIL20* α=0.46487 β=17987.0 **α** **0.2** **0.1** **0.02** **0.01** **0.05**	*APRIL 20A* α=0.52444 β=59887.0 **α** **0.2** **0.1** **0.02** **0.01** **0.05**	*APRIL 21* α=0.43158 β=40388.0 **α** **0.02** **0.01** **0.05**	*APRIL 22* α=0.4519 β=12749 **α** **0.2** **0.1** **0.02** **0.01** **0.05**	*APRIL 22A* α=0.52754 β=61344.0 **α** **0.2** **0.1** **0.02** **0.01** **0.05**	*April 24* α=0.39735 β=30833.0 **α** **0.2** **0.1** **0.02** **0.01** **0.05**	*April 28* α=0.39871 β=1.6436E+5 **α** **0.2** **0.1** **0.02** **0.01** **0.05**	*April 29* *(3p)* α=0.42072 β=1.1943E+5
	May 14 α=0.43653 β=38847.0 **α** **0.2** **0.1** **0.02** **0.01** **0.05**	*May 15* α=0.30074 β=2793.4 **α** **0.2** **0.1** **0.02** **0.01** **0.05**	*May 18* α=0.38193 β=47615.0 **α** **0.2** **0.1** **0.02** **0.01** **0.05**						

Arrival Time Distributions Parameters PC12-PC7 of two devices Scenario

logPearson3	APRIL16 α=41.215 β=-0.39331 γ=25.35 **α** **0.2** **0.1** **0.02** **0.01** **0.05**	APRIL20 α=1179. β=-0.07568 γ=97.856 **α** **0.2** **0.1** **0.02** **0.01** **0.05**	APRIL 20A α=9.431 β=-0.7616 γ=17.147 **α** **0.2** **0.1** **0.02** **0.01** **0.05**	APRIL 21 α=19.311 β=-0.64585 γ=21.777 **α** **0.02** **0.01**	APRIL 22 α=372.69 β=0.13734 γ=-42.973 **α** **0.2** **0.1** **0.02** **0.01** **0.05**	APRIL 22A α=0.71858 β=24105.0 γ=40.0 **α** **0.2** **0.1** **0.02** **0.01** **0.05**	April 24 α=76.306 β=-0.351 γ=35.717 **α** **0.2** **0.1** **0.02** **0.01** **0.05**	April 28 α=35.069 β=-0.52497 γ=29.143 **α** **0.2** **0.1** **0.02** **0.01** **0.05**	April 29 α=11.185 β=-0.832 γ=19.72 **α** **0.1** **0.02** **0.01** **0.05**
	May 14 α=261.12 β=-0.1722 γ=54.299 **α** **0.2** **0.1** **0.02** **0.01** **0.05**	May 15 No match	May 18 α=17.212 β=0.76441 γ=22.461 **α** **0.02** **0.01**						

Arrival Time Distributions Parameters PC12-PC7 of two devices Scenario

Log Logistic (3p)	APRIL16 α=0.6489 β=9036.0 γ=20.0 **α** **0.2** **0.1** **0.02** **0.01** **0.05**	APRIL20 α=0.60143 β=5597.8 γ=18.0 **α** **0.2** **0.1** **0.02** **0.01** **0.05**	APRIL 20A α=0.70014 β=24545.0 γ=30.0 **α** **0.2** **0.1** **0.02** **0.01** **0.05**	APRIL 21 α=0.54795 β=10596.0 γ=19.0 No match	APRIL 22 α=0.60439 β=3135.0 γ=19.0 **α** **0.2** **0.1** **0.02** **0.01** **0.05**	APRIL 22A α=0.71858 β=24105.0 γ=40.0 **α** **0.2** **0.1** **0.02** **0.01** **0.05**	April 24 α=0.53169 β=8205.5 γ=19.0 **α** **0.2** **0.1** **0.02** **0.01** **0.05**	April 28 α=0.53609 β=65966.0 γ=80.0 **α** **0.1** **0.02** **0.01** **0.05**	April 29 α=0.57145 β=38436.0 γ=121.0 **α** **0.02** **0.01** **0.05**
	May 14 α=0.58845 β=13216.0 γ=29.0 **α** **0.2** **0.1** **0.02** **0.01** **0.05**	May 15 α=0.45392 β=181.59 γ=17.0 No match	May 18 α=0.53046 β=13421.0 γ=18.0 **α** **0.02** **0.01**						

Arrival Time Distributions Models One Device.

DISTRIBUTION Kolmogorov-Smirnov	PC1=PC6	PC1=PC6 Morning	PC1=PC6II	PC13=PC18 I	PC13=>PC18 II	PC13=>PC18 III	PC13=>PC18 Mor	PC7=PC12	PC7=PC12 II
Weibull(3P)	α=0,44781 β=43102,0 γ=22,0 **α 0.2 0.1 0.02 0.01 0.05**	α=0,37007 β=51917,0 γ=48,0 **α 0.02 0.01 0.05**	α=0,37096 β=1,1002E+5 γ=22,0 **α 0.2 0.1 0.02 0.01 0.05**	α=0,36359β =33078,0 γ= 70,0 **α 0.2 0.1 0.02 0.01 0.05**	α=0,36569 β=56950,0 γ=100,0 **α 0.2 0.1 0.02 0.01 0.05**	α=0,37254 β=39864,0 γ=18,0 **α 0.1 0.02 0.01 0.05**	α=0,42072 β=51369,0 γ=81,0 **α 0.2 0.1 0.02 0.01 0.05**	α=0,40541 β =29617,0 γ=40,0 **α 0.02 0.01**	α=0,41774 β=23077,0 γ=21,0 **α 0.1 0.02 0.01 0.05**
Weibull	*α=0,45195 β=37777,0* **α 0.2 0.1 0.02 0.01 0.05**	*α=0,3965 β=43890,0* ***α 0.02 0.01***	*α=0,35623 β=88440,0* ***α 0.2 0.1 0.02 0.01 0.05***	*α=0,41538β =36944,0* **α 0.1 0.02 0.01 0.05**	*α=0,35982 β=50203,0* **α 0.2 0.1 0.02 0.01 0.05**	*α=0,39906β =37929,0* **α 0.1 0.02 0.01 0.05**	*α=0,45418 β=56883,0* **α 0.2 0.1 0.02 0.01 0.05**	*α=0,43379 β =27218,0* **α 0.02 0.01**	*α=0,50531 β=22683,0* **α 0.2 0.1 0.02 0.01 0.05**
LogPearson3	α=40,396 β=-0,41809 γ=26,213 α 0.2 0.1 0.02 0.01 0.05	α=2018,8 β=-0,06613 γ=142,81 α 0.02 0.01 0.05	α=11,285 β=-0,98063 γ=20,956 α 0.1 0.02 0.01 0.05	α=131,83 β=-0,24437 γ=-22,987 α 0.2 0.1 0.02 0.01 0.05	α=838,13 β=-0,10791 γ=99,862 α 0.2 0.1 0.02 0.01 0.05	α=11900, β=-0,02709 γ=331,51 α 0.1 0.02 0.01 0.05	α=46,476 β=-0,38762 γ=27,752 α 0.2 0.1 0.02 0.01 0.05	α=1460,9 β=-0,07188 γ=113,94 α 0.02 0.01 0.05	α=2125,5 β=-0,05226 γ=120,02 α 0.2 0.1 0.02 0.01 0.05

Arrival Time Distributions Models One Device.

LogLogistic(3P)	α=0,63487 β=10466,0 γ=22,0 **α** **0.1** **0.02** **0.01** **0.05**	α=0,50313 β=8782,3 γ=48,0 **α** **0.02** **0.01** **0.05**	α=0,45385 β=20033,0 γ=22,0 **α** **0.02** **0.01** **0.05**	α=0,556 β=9679,6 γ=70,0 **α** **0.2** **0.1** **0.02** **0.01** **0.05**	α=0,45934 β=8376,8 γ=100,0 **α** **0.1** **0.02** **0.01** **0.05**	α=0,53446 β=10787,0 γ=18,0 **α** **0.1** **0.02** **0.01** **0.05**	α=0,6168 β=17421,0 γ=81,0 **α** **0.2** **0.1** **0.02** **0.01** **0.05**	α=0,58884 β=9000,2 γ=40,0 **α** **0.02** **0.01**	α=0,7001 β=7942,2 γ=21 **α** **0.2** **0.1** **0.02** **0.01** **0.05**