

A SonATA Glossary

2006 October 5

ADC	analog to digital converter
alias	An actual signal appearing where it should not
Archiver	subsystem of the SSE that stores selected data
ATA	Allen Telescope Array
backend	signal processing system that uses the output(s) of the ATA
band	a limited range of frequencies
baseband	a band that (typically) includes DC
beam	a narrow patch of the sky selected by the ATA beamformer
beamformer	part of the IF processor that sums the samples from the ATA with appropriate complex weights to produce a beam
bin	usually one of the very narrow bands used by the SonATA detectors , but can also be used more generally, for example a channel
cache	relatively small but very fast memory cohabiting with a CPU
candidate	a statistically significant signal worthy of further observation, <i>e.g.</i> not already known as RFI .
CASPER	Center for Astronomy Signal Processing and Electronics Research at UCB
CDR	critical design review
channel	the result of the first, relatively coarse division of the IF frequency band , currently ~400 kHz in width.
Channelizer	Subsystem of SonATA that produces channels
coherent	coherent averaging means averaging the Re and Im parts of samples separately, usually used in <i>coherent detector</i>
confirmation	redetection of a candidate ET signal by independent observers at another observatory
core library	a shared library of compiled code that provides the core algorithms used to create DFBs
CPU	central processing unit
CW	a “continuous wave” signal, <i>i.e.</i> one that looks sinusoidal over some time interval. In SonATA usage we call a signal that has a slowly changing frequency, of order a few Hz/s, a “drifting CW” signal.
DADD	Doubling Accumulation Drift Detection, a detection algorithm that finds

	slowly drifting CW signals in a set of M spectra with order $M \log_2(M)$ operations instead of the order M^2 operations required by the ‘brute force’ method.
DC	nominally “direct current” but used for signals near zero frequency, as in DC band
DD	Data Distribution Subsystem of SonATA
detection	a statistical process that finds specified signals with a low probability of false alarms due to noise alone
detector	a hardware or software process that performs detection
DFB	digital filter bank
DME	distance measuring equipment, a radio-navigation system used by most aircraft
DX	Detector Subsystem of SonATA
element	An ATA antenna plus its associated electronics
ET	extra-terrestrial or extra-terrestrial technology
Ethernet	A hardware protocol for exchanging data between computers. Usually, Ethernet protocol specifies the wire-level signals that carry IP packets between nearby computers.
feed	a passive microwave assembly that couples the incoming waves at the focus of an antenna to the transmission line that drives the FE .
FE	front end, the cryogenic, low-noise amplifier directly connected to the feed of each ATA element
FFT	Fast Fourier Transform
FPGA	Field-Programmable Gate Array
G-	“giga-“, prefix for 10^9
Gb, Gbit	gigabit, 10^9 bits
GB, Gbyte	gigabyte, 10^9 bytes
GbE	gigabit Ethernet
Gflop	10^9 floating point operations per second
GHz	gigahertz
GPS	Global Positioning System
HS	Hardware Support Subsystem of SonATA
HVAC	heating, ventilating, and air-conditioning
IF	intermediate frequency, produced as part of the conversion of an RF signal to baseband
IFP	IF Processor Subsystem of the ATA

Im	imaginary part (of a complex number)
incoherent	incoherent averaging means averaging the powers (squared modulus) of samples , usually used in <i>incoherent</i> detector
I/O	input/output
IP	Internet Protocol
Iridium	orbiting sources of RFI
k	1) kilo, 10^3 , or 2) Boltzman's constant
kW	kilowatt
LAN	local area network
LEO	low earth orbit or a satellite in such an orbit
LO1	the first local oscillator in a frequency conversion system
M-	mega-, 10^6
MHz	megahertz
multicast	Multicast is the delivery of packets to a group of destinations simultaneously using an efficient strategy to deliver the data over each link of the network only once by creating copies when the links to the destinations split. <i>Multicast</i> is typically used to refer to IP Multicast, the implementation on the IP routing level.
noise	Random voltages caused by thermal motion
NRE	Nonrecurring engineering, one-time engineering costs associated with a project.
NSF	National Science Foundation
NSS	New Search System, a precursor to SonATA
packet	A formatted block of information carried over an IP network. Varieties include, TCP , UDP , unicast , and multicast packets.
PANDI	phased array network data interface, a component of the ATA IFP
PD	pulse detector
PDM	Programmable Detection Module, the detector unit of the NSS
PFB	polyphase filter bank, a particular implementation of a DFB , sometimes inaccurately used for a WOLA DFB
port	A virtual data connection between computer programs through a computer network. The IP uses the port number to direct information to a specific process on a computer.
prelude	The NSS running on the ATA is the Prelude to SonATA .
process	A running instance of a computer program, which may create and control many threads . Generally, separate processes do not directly share

	memory with one another (as opposed to threads).
quantization	the process of representing an analog signal using integers
RAID	redundant array of inexpensive disks
RAM	random access memory
RDMA	Remote direct memory access, a method to reduce Ethernet overhead
Re	real part (of a complex number)
RF	radio frequency, in the context of the ATA the signal as received directly from the sky before frequency conversion
RFI	radio frequency interference
ripple	variation in the in-band response of a filter
RMS	root mean square
sample	the result of a single act of quantization or such a result (representing a signal voltage) after further processing
server	a computer, usually configured for rack mounting, intended for tasks requiring heavy I/O and/or computing
SETI	search for extraterrestrial intelligence
SI	the SETI Institute
SIMD	single instruction, multiple data
sky survey	a type of SETI that covers a large amount of solid angle on the sky
SNR	signal power to noise power ratio
socket	A communication end point on an internet protocol (IP) network. A socket may be specified with a protocol (e.g. TCP , UDP), IP address, and port number.
SonATA	SETI on the ATA , a SETI search system designed to work well with the ATA
SSE	Search System Executive, the control subsystem of SonATA
sub-band	result of sub-dividing a band , most often used to describe the approximately kHz bands into which the first stages of DX divide the incoming channels .
switch	A hardware device to interconnect computers over a network (usually Ethernet).
T-	“tera-“, prefix for 10^{12}
targeted search	a type of SETI that looks at a (large, often) list of specific targets, <i>i.e.</i> positions on the sky
TCP/IP	Transmission Control Protocol/Internet Protocol; a high reliability protocol for computers to send messages to one another. TCP provides

	reliable, in-order delivery of data from sender to receiver (compare with UDP). TCP does not support multicast , and does not control time of delivery.
Tflop	10^{12} floating point operations per second
thread	A way for a running computer program (process) to split itself into two or more simultaneously (or pseudo-simultaneously) running tasks. Multiple threads that are created by the same process may access the same memory. Threads allow a single process to take advantage of multiple CPUs .
TOE	TCP Offload Engine, a method to reduce Ethernet overhead
T_{sys}	system temperature, a measure of noise at the FE , or the amplified versions of that noise in later stages of signal processing
tuning	for the ATA , one of four RF bands selected using one of four LO1 's.
UCB	the University of California at Berkeley
UDP/IP	User Datagram Protocol/Internet Protocol; a protocol for computers to send short (typically < 16 kB) messages to one another. UDP messages are not guaranteed to be in-order or always to arrive at all at their destination (compare with TCP). UDP supports multicast , and data sent via UDP will arrive at its destination within a calculable time window.
Unicast	Unicast is the delivery of packets to a single destination
UPS	uninterruptible power supply
vectorized	in the context of SonATA , organized for efficient computation using SIMD
verification	follow-up observations of a candidate ET signal performed with SonATA , possibly in conjunction with another radio telescope using VLBI , made to verify that the candidate signal meets all the tests we can think of to discriminate real ET signals from other signals. The first stages of the verification process are performed by the SSE automatically. See confirmation .
VLBI	very long baseline interferometry
WOLA	weighted overlap and add, a particular implementation of a DFB