Antelope 4.6



Antelope 4.6 – What's New and Different?

- Administrative: architectures, operating systems, licensing, etc.
- Infrastructure changes
- New programs and scripts
- New toolbox modules
- Changes to existing modules
- Back-compatibility issues



Administrative



Before We Get Started...

• Antelope core software

- Scrupulously developed, tested, maintained and supported by BRTT
- Included on *Antelope* CDs
- Both closed and open source
- **Antelope** contributed software
 - Developed and maintained (maybe) by original authors (could be BRTT, but generally not)
 - BRTT assumes no responsibility for effectiveness or support
 - Built by BRTT (but not tested) and included on Antelope CDs
 - Conforms to a minimum set of requirements
 - will build with normal *Antelope* toolbox
 - documented
 - complete (no third party software)
 - Open source
 - Users have access to source CVS repository through Antelope User Group web site at http:// www.indiana.edu/~aug
- Software Junkyard
 - Generally designed to work in an **Antelope** environment HOWEVER:
 - Absolutely no implied support or maintenance of any kind
 - No software requirements whatsoever anything goes (may be incomplete, ineffective, undocumented, etc.)
 - **NOT** on **Antelope** CDs
 - Open source
 - Users will have access through Antelope User Group web site
 - New concept not yet implemented



Architectures, OSs and Installing

- **Antelope** 4.6 was built on the following:
 - SUN / SPARC / Solaris 8 (like 4.5)
 - INTEL / X86 / Linux 2.4.19 (like 4.5) using SuSE 8.1
 - Special stripped-down "volpi" version
 - We dropped the X86 / Solaris version
 - There are no ARM/X-SCALE or Mac versions that are currently being released
- All versions are on the same CD (like 4.5)
- Installation like 4.5 (mostly)



Installation and Administrative: Installing and Registering

- Prior to installation:
 - You will need roughly 800 Mbytes of space
 - You will need your e-mail running properly (in order to send the license request)
 - You will need to be connected to the internet (in order to obtain software patches)
 - You will need a graphical X-windows interface (in order to run the installation scripts)
 - Install as root or some other user?
 - Probably root for multiple user access
 - Antelope MUST install at /opt/antelope
 - Either 1) space at /opt/antelope, or 2) a symbolic link at /opt/ antelope to some other place, or 3) auto/remote mounting at /opt/ antelope from some other place
 - Probably need root permission for creating /opt/antelope
 - Look at **README** on the root directory of the **Antelope** distribution CD for more information



Registering and Licensing

- Major changes to registration and licensing
 - previous licenses were "fragile" – new licenses should be much more robust
 - registration form changes to support user requested architectures and node clusters

🕺 Register Antelope Release 4	.6 Linux 2.4.19-4GB 2004-03-30						
Name * (* means entry is required)	e-mail address *						
Danny Harvey	danny@brtt.com						
Institution/Business *							
Boulder Real Time Technolog	gies, Inc.						
Department	telephone number *						
	303-442-4946						
address line 1 *	FAX number						
2045 Broadway Street	720-274-0096						
addrage line 2		*					
Suite 400							
City ^		State/Province *					
Boulder		lco					
Country *	Zip/Mail Gode *	- Architecture					
USA	80302	Sun OS Spare					
hostname *	IP address *	🗐 Sun OS Intel					
kor.brtt.com	207,174,76,132	F Linux Intel					
license-type	Cluster	🖬 Linux Arm					
node -		MacOSX RowerRC					
hostid	hostinfo *						
0x7f0200	662acc409dc903c199a	79d37ad068100					
	2nd e-mail address	3rd e-mail address					
	danq@brtt.com						
any comments or special requests	, .						
This is for a laptop compu	ter with a changing ip ad	Idress					
Register		Quit					



Installation and Administrative : Licenses

• How does licensing work?

- Antelope software modules automatically read the \$ANTELOPE/ data/pf/license.pf file to determine the license type and to read the license keys.
- Based upon the license type, the *Antelope* software module then looks at the system time, queries the host computer and/or its internet connections and computes another set of license keys.
- If the computed keys match the keys in the license.pf file, then the license is OK and the module will run properly, otherwise an error exit will occur.
- A set of different license keys can be listed in the license.pf file, in which case the license checking software will check the computed keys against all of the keys in the license.pf file. If any of the keys match, then the module will run properly.
- The current state of licensing for a particular Antelope installation can be checked by running check_license [-v[v]]
- New licenses <u>MUST</u> be requested by running **register_antelope**



Installation and Administrative : Licenses

• License types

- Subnet licenses
 - These licenses will enable multiple host computers that have ip-addresses within a single class-C subnet (first three numbers of numerical ip-address).
 - BRTT will not give out subnet licenses for "private" networks (e.g. 192.168.xxx.xxx) or for any subnets that are not name served and do not belong to qualified users. Usually this means that we will not provide subnet licenses for host computers that get their ip-addresses via DHCP or private non-name served addresses behind a firewall.

- IP licenses

- These licenses will enable a single ip-address. Any host computer that is configured at the enabled address should be able to run the software.
- Same restrictions as subnet licenses.

Node licenses

- These licenses will enable a single host computer regardless of its internet connections.
- This is accomplished through the use of a "host fingerprint" a hashed version of a complex hardware-based identification profile that is intended to uniquely identify a particular computer system.

• Other license restrictions

Independent of the license types, *Antelope* licenses can be time-limited, architecture/OS limited, and/or capability limited.



Installation and Administrative : Licenses

kor: /home/danny - Shell - Konsole <2>

- The current state of licensing for a particular Antelope installation can be checked by running check license -vv
- The node fingerprint, **hostinfo**, and the list of currently configured ipaddresses is determined.
- Each license key is compared against the node fingerprint and the ip-addresses to determine if any are OK

Session Edit View Bookmarks Settings Help 74 kor% 74 kor% more /opt/antelope/4.6/data/pf/license.pf # Install this file into /opt/antelope/4.6/data/pf/license.pf n5091745ac02df21be49742941743d9468d772e85 # subnet 207.174.76.0 h5091745a62ecfc44cde72853d4238df0f03d05db # node standalone kor.brtt.com n5091745a2b54e9a7338938f5bd5e160a0650f06e # subnet restricted 207.174.76.0 h5091745ae71d26d2418b8344e3f2e50dad911ebc # node vmware kor.brtt.com # no more expiration warnings # uncomment to eliminate license expiration warnings 75 kor% 75 kor% 75 kor% check license -vv /opt/antelope/4.6/data/pf/license.pf hostinfo = f81d2126777263cd5cd0204147329e31 ip address(es) are 207.174.76.156 n5091745ac02df21be49742941743d9468d772e85: subnet ok Licensed abilities: datascope orb connections trace manipulation tk gatherplot tk_graphs tk_rt_trace_display rt data exchange kinemetrics acq old quanterra acq q330 acq cdl connections sdas ground motion rt network db network Licensed architectures: linux intel h5091745a62ecfc44cde72853d4238df0f03d05db: node ok Licensed abilities: datascope orb connections trace manipulation tk gatherplot tk graphs tk rt trace display rt data exchange kinemetrics acq old quanterra acq q330_acq cd1 connections sdas ground motion rt network db network Licensed architectures: linux_intel n5091745a2b54e9a7338938f5bd5e160a0650f06e: subnet restricted ok Licensed abilities: datascope orb connections trace manipulation tk gatherplot tk graphs tk rt trace display rt data exchange kinemetrics acq old quanterra acq cdl connections q330_acq sdas ground motion rt network db network Licensed architectures: linux intel h5091745ae71d26d2418b8344e3f2e50dad911ebc: node **fails** invalid license code license ok 76 kor% New Shell



Infrastructure Changes



Antelope Distribution

- New versions of perl (5.8) and tcl/tk (8.4)
- Both perl and tcl/tk are located in "versioned" sub-directories (/opt/antelope/perl5.8 and /opt/antelope/tcltk8.4)
- This means that both 4.5 and 4.6 versions of *Antelope* can be installed on the same filesystem and both versions can be used without having to uninstall 4.5.



Antelope Parameter Files

- New macro substitution-type capabilities in 4.6:
 - &file(path), &filename(path), &datafile(path),
 &datafilename(path) substitute relative file paths or file contents
 - **&env (name)** substitute value of **name** environment variable
 - &name, & { name } substitute value of defined name parameter



ORB Changes

• If an @ character is appended to an ORB hostname specification, then the ORB open will never return with an error, but retry forever:

% orb2orb igpprt.ucsd.edu:anza@ localhost

• If an @ character precedes an ORB match or reject string specification, such as @ *spec*, then the *spec* part is used as a file name of a file that contains a list of match or reject strings:

```
% cat my_select_strings
AZ_CRY/BBA/HS
CI_SVD_.HZ/.*
% orbstat -d all -m @my_select_strings igpprt.ucsd.edu:anza
AZ_CRY_HHE
AZ_CRY_HHN
AZ_CRY_HHZ
AZ_CRY_HLE
AZ_CRY_HLE
AZ_CRY_HLN
AZ_CRY_HLN
AZ_CRY_HLZ
CI_SVD_BHZ
CI_SVD_HHZ
```

• The **valid_ip_addresses** table in the **orbserver.pf** file may now contain entries of the form:

207.174.76.0 255.255.255.0 /db/.*//log/.*

which allows only **/db/**. ***** (database row) and **/log/**. ***** (log message) type packets to be read from hosts on the 207.174.76.0 class-C subnet.

• A new **orbserver.pf** parameter, **reject_message**, can be specified as a string that will be displayed at the client end whenever an ORB connection is rejected due to improper permissions



New Programs and Scripts



dbbuild

A new program (perl script) for building the "metadata" part of a Datascope database (*site*, *sitechan*, *sensor*, *instrument*, *calibration*, *stage* tables plus external instrument response files)

- Can operate in either interactive or batch mode.
- Can run from a master configuration file
- Uses user-configurable singlestage response files plus a set of parameter files that describe "standard" dataloggers, preamps and sensors

🗙 Master Database Construction 🧕 📃] ×								
Database Configuration	Help								
onfiguration time Comment									
/1/2004									
Network									
net network name									
XT SECARIB - Passcal Broadband Experiment									
Station									
sta. Intitude longitude elevation station name									
ZUPC 🛓 8.3597 -65.1951 0.0960 Zuata									
Sensor Episensor 200 Hz 10 Volt FS 2%									
episensor_2g_10vfs									
y ≥ serial number edepth band rsptype loc code									
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axis hang wang sensorgain lead preampgain preampstage									
y 5 N 0 90 5.1e−10 ±									
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dbbuild

- Included are 180 single-stage response files in \$ANTELOPE/ data/responses
- Included are 23 sensor parameter files in \$ANTELOPE/ data/instruments/sensors:
 - Guralp CMG-3 KMI Episensor Oyo Hall/Sears HS10 Streckeisen STS-1

Guralp CMG-3 NSN KMI FBA-23 Mark Products L22 Streckeisen STS-2 Guralp CMG-3T KMI Ranger SS1 Mark Products L28 Terratech Guralp CMG-40T Geotech KS54000 Mark Products L4 Nanometrics Trillium

 Included are 20 datalogger parameter files in \$ANTELOPE/ data/instruments/dataloggers:

Guralp DM24 Quanterra Q330 Reftek RT130 KMI Etna Quanterra Q730 Reftek RT72A-07 KMI K2-Mt. WhitneykQuanterra Q4120Reftek RT72A-08N

KMI Makalu

Nanometrics Trident

• Files in the **responses**, **sensors** and **dataloggers** sub-directories are well documented ASCII files that can be changed and created by our users to produce new instrument components



qtunbale

A perl script for extracting mini-SEED data from a Quanterra PB/14 Packet Baler:

- Uses the native http-web interface for extracting mini-SEED files in user specified time ranges from the Baler
- Will repackage mini-SEED files on-the-fly into user specified time volumes and user specified file names
- Will rename the SEED network-station-channel-location codes onthe-fly based on user specified translations (e.g. change serial number type station codes into normal alphabetic codes)
- Will automatically pipe the resulting mini-SEED files into a Datascope database extractor or into SEED packets for real-time ORB transfers
- WILL NOT control the Baler in regards to 1) power cycling, 2) ipaddress assignments, 3) Baler filesystem maintenance



orbwfrms

A program for computing running RMS averages of waveform data through a set of user specified filters:

- Written in C to provide a complete source code example of robust, high-performance real-time continuous waveform processing
- Source code, parameter file template, man page and Makefile can be found in /opt/antelope/ 4.6/example/c/rtproc
- As part of this project, we have introduced a number of new tools in the *Antelope* toolbox



dlcmd

A program for sending commands to all data acquisition modules and dataloggers:

- Eventual replacement for k2cmd, qtcmd, etc.
- Can "broadcast" commands to any number of data acquisition modules and dataloggers
- Currently functional with qt2orb, k22orb, and q3302orb
- In the 4.6 release only supports pingt command (and getconfig command for Q330 dataloggers only)
- Will be supported in the future by new Antelope tools that will offer standard interfaces for user-developed data acquisition modules



dbgme

A program for computing ground motion estimates :

- Operates on data contained in a Datascope database and outputs database referenced binary numerical X-Y grids of estimated peak ground acceleration, velocity and instrumental Mercali intensity
- Requires pre-computations of measured peak acceleration and velocity along with earthquake location and magnitude
- Designed as a basic "substrate" for managing user written "delegate" subroutines for making the various corrections due to geological effects, for modeling the ground motion in areas away from the observations and for making the empirically-based motion-to-intensity extrapolations.
- Relies on a new set of computational geometry tools in the Antelope toolbox for final interpolation onto regular Cartesian grids
- DOES NOT INCLUDE ANY GRAPHICAL OR WEB INTERFACES FOR DISPLAYING THE GRIDS



Various New ORB-based Programs

- **orbxchange** Multi-threaded version of **orb2orb** that will:
 - Maintain simultaneous and independent connections to any number of orbservers running on any hosts
 - Automatic switchover to alternate **orbserver**s whenever the primary connections go down
 - Checks to insure that packets are not duplicated
- **rtorbcmd** Client/server for sending and executing remote commands
 - Includes a rudimentary authentication capability to prevent spoofing
 - Will cause the remote execution of ANY command on the remote UNIX system
- **orbtail** ORB browser for displaying error and other logs that are contained in an ORB
- **orbstaseg** Detection-based real-time waveform segmenter *for a single station*
 - Segments so that the output segmented waveforms have no time overlaps
 - Output segmented waveforms can be re-packaged both channel-wise and timewise
- **orb2genc** De-multiplexes and reformats any waveform packets into GENC format. Also will fill in the *calib*, *calper* and *segtype* packet fields



New Toolbox Modules



New ORB-based Tools

- **pktchannelpipe (3)** MT-safe tool that provides a time-ordered queue for buffering waveform data channels in real time as they appear on an ORB:
 - Unstuffs packets automatically and provides the programmer with channel-based queues
 - Programmer can specify tables of channel select and reject expressions that automatically sift the incoming data
- **pktchannelcalib(3)** MT-safe tool that provides a means for efficient retrieval of site and instrument response information from a database to be used in ORB waveform packet processing:
 - Caches database views to prevent new view generation for each waveform packet
 - Refreshes cache only when 1) a new channel is seen in the data stream or 2) one or more of the database tables have been modified
- **orbreapthr(3)** Threaded version of **orbreap(3)**
 - Interfaces with other threads through the use of the new pmtfifo(3) POSIX MT-safe FIFO tool.
 - Provides "peek" and timeout capabilities for reaping ORB packets.
- **orbputthr(3)** Threaded version of **orbput(3)**
 - Interfaces with other threads through the use of the new pmtfifo(3) POSIX MT-safe FIFO tool.
 - Allows many threads to write packets through a single ORB connection.



Other New Tools

- **pmtfifo(3)** POSIX-based MT-safe tool that provides a First-In-First-Out (FIFO) queue of pointers:
 - Allows synchronization of many different threads by "pushing" and "popping" pointers on to and off of pointer queues
 - Provides both blocking and unblocked access
 - Provides "peeking" and timeout capabilities
 - Blocking interfaces can be dynamically changed to unblocked interfaces
 - Blocking calls can be temporarily released from another thread
 - Pointers that have been popped off of the queue can be put back with an "unpop" call
- parse_param(3) A high level interface to the various
 pfget(3) calls:
 - Provides the programmer with control of error processing



Changes to Existing Modules



dlmon

- Supports any number of multiple targets (qt2orb, k22orb, and q3302orb)
- Uses a generalized naming standard for status, log, command and response ORB packets
- Provides command-line select expressions and ORB start positions
- Provides a set of templates for defining particular manufacturer status variables and a command line option for selecting a particular template
- Supports Quanterra and Kinemetrics dataloggers and replaces the depricated k2mon and qtmon scripts
- Provides expanded control capability for Kinemetrics dataloggers
- Sorts the dataloggers in the status display so that the problems (red) are always at the top and otherwise alphabetically



dlmon

dimon:::														-									
File																							
sta	SLT	runtm	dr	cme	pkp	buf	mO	m1	m2	temp	volt	amp	lat	lon	elev	gpss	gps	cick	cldrf	VCO	citncy	dgp	ditncy
0163	Om		76	0.0%	0																	0s	
0162	Om	52m	4.0k	100%	3515	0.0%	8	-21	-1	23C	13.7V	53mA	34.074	-106.919	1445m	offt	lf	н	Ous	2068	2h	0s	2s
0185	Om	52m	4.1k	100%	3518	0.0%	-3	-3	-9	22C	13.8V	73mA	34.074	-106.919	1419m	ona	lf	н	4us	1978	3h	0s	1s
0347	Om	52m	4.1k	100%	3517	0.0%	-11	-15	-7	23C	13.8V	51mA	34.074	-106.919	1420m	offp	lf	н	-1us	2025	32m	0s	1s
0354	Om	52m	3.9k	100%	3539	0.0%	5	7	-7	22C	13.8V	68mA	34.074	-106.919	1424m	ona	3D	Т	-10us	1962	Os	0s	1s
0357	Om	52m	4.1k	100%	3540	0.0%	-8	3	-6	24C	13.8V	77mA	34.074	-106.919	1446m	ona	lf	н	Ous	1986	1h	0s	1 s
0434	Om	52m	2.5k	100%	3891	0.0%	20	20	20	23C	13.8V	46mA	34.074	-106.919	1427m	offp	lf	н	1us	2021	32m	0s	1s
0443	Om	52m	4.0k	100%	3517	0.0%	9	-6	14	25C	13.8V	52mA	34.074	-106.919	1437m	offp	lf	н	3us	1989	47m	0s	1s
0447	Om	52m	3.7k	100%	3519	0.0%	7	1	8	25C	13.8V	72mA	34.074	-106.919	1429m	ona	3D	L	4us	1981	Os	0s	1s
0448	Om	52m	3.6k	100%	3519	0.0%	13	2	-11	27C	13.7V	71mA	34.074	-106.919	1442m	ona	lf	н	1us	2010	1h	0s	1s
BR_BQ330	Om	52m	16k	100%	12585	0.0%	20	20	21	26C	13.7V	60mA	40.019	-105.281	1628m	offp	lf	н	Ous	2173	35m	0s	1s
BR_ETNA	Om	51m	14k							32C	13.4V		40.019	-105.281	1626m	on	L	IG	Ous		52m	0s	1s
BR_K2	0m	49m	0							33C	13.2V		40.019	-105.281	1626m	on	U	IG	-1.0ms		52m	0s	51m
BR_Q4120	Om	50m	1.4k										40.019	-105.281	1625m		3D	L	256us	2155	30s		8s
ALL STATIONS																							
<pre>2004121 18:37:40.435: ruperq3: 0163: q3302orb: q330_run_data_thread: registering. 2004121 18:37:40.435: ruperq3: 0163: q3302orb: Registering for ip address 129,138,26,73:50016, serial no. 010000069A40C060. 2004121 18:37:52.054: ruperq3: 0347: LOG: 2004121 18:37:51: data_clk_qual = elck fr, data_clk_pll = h, data_clk_ltc = 1920,000 sec 2004121 18:37:57.160: ruperq3: 0163: q004121 18:37:56: data_clk_qual = elck fr, data_clk_pll = h, data_clk_ltc = 9720,000 sec 2004121 18:37:57.160: ruperq3: 0163: q004121 18:37:59: data_clk_qual = elck fr, data_clk_pll = h, data_clk_ltc = 202,000 sec 2004121 18:38:00.475: ruperq3: 0163: q002orb: q004121 18:37:59: data_clk_qual = elck fr, data_clk_pll = h, data_clk_ltc = 202,000 sec 2004121 18:38:00.475: ruperq3: 0163: q002orb: q004121 18:38:09: data_vco = 1963 2004121 18:38:11.059: ruperq3: 0357: LOG: 2004121 18:38:10: data_clk_qual = elck fr, data_clk_pll = h, data_clk_ltc = 3840,000 sec 2004121 18:38:110.697: ruperq3: 0162: LOG: 2004121 18:38:15: data_clk_qual = elck fr, data_clk_pll = h, data_clk_ltc = 1920,000 sec 2004121 18:38:110.597: ruperq3: 0162: 2004121 18:38:15: data_clk_qual = elck fr, data_clk_pll = h, data_clk_ltc = 1920,000 sec 2004121 18:38:110.697: ruperq3: 0162: 2004121 18:38:15: data_clk_qual = elck fr, data_clk_pll = h, data_clk_ltc = 3860,000 sec 2004121 18:38:12.0475: ruperq3: 0162: LOG: 2004121 18:38:19: data_clk_qual = elck fr, data_clk_pll = h, data_clk_ltc = 3960,000 sec 2004121 18:38:20.485: ruperq3: 0163: q002orb: q0020rb: q0020rb: g0020rb: g002</pre>														3									
Status: Time: 2004121(4/30) 18:38:41 UTC																							



q3302orb

- Many changes included in patches to the 4.5 version:
 - Many bug fixes on original version
 - Changes to support systematized generation of status waveform packets
 - Arbitrary time-channel packaging of output waveform data
- Integrate with new **dlmon** and **dlcmd**:
 - Support dlcmd getconfig command that will return a (nearly) complete configuration state in parameter file form
- Streamlined open/close and register/deregister
- Streamlined packet acknowledgements
- Automatically detect datalogger reconfiguration and cycle (close/deregister/reregister/open) any running data connections
- Convert to new **pktchannelcalib** tool



k22orb

- Integrate with new **dlmon** and **dlcmd**
- New command for erasing the Altus disk and running monitor commands
- Can specify "any" for **serial** and **model** parameters for point-to-point wired connections
- Convert to new **pktchannelcalib** tool
- Convert to new **orbreapthr** tool
- Support for continuous streaming data rates other than 100 sps (continuous sample rate is now specified in the parameter file)
- Streamlined initial startup for continuous connections
- User can specify the Altus streaming timeout parameter for continuous connections (this allows the user to put the datalogger into "mode 1" so that the data stream will never timeout)



- **qt2orb** Integrate with new **dlmon** and **dlcmd**
- orbwfmeas/dbwfmeas Add new wfmgme measurements (peak vector velocity, peak vector accelration, Wood-Anderson displacement) to support dbgme
- **orbmag/dbml** Implement waveform clip limits to prevent clipped channels from being used to compute magnitudes
- orbtrigger Implement a new number-of-stations breakpoint table that is used to send out preliminary pick lists to orbassoc
- **orbassoc** Use a new **phase_sifter** parameter that is a UNIX regular expression matched against the input pick list phase codes for each grid to restrict the candidate pick list to certain detections



Back-Compatibility Issues



- WE CHANGED THE SCHEMA DEFINITION OF THE calibration TABLE!
 - You will have to convert all *calibration* tables to the new schema definition using the **convert_calibration** script
 - Changes were necessary to support **dbbuild**
- The 4.6 dlmon will probably not work with the prior version data acquisition programs also, the prior versions of qtmon and k2mon will probably not work with the 4.6 data acquisition programs

