IP Copper™

USC10G3

10-GbE Packet Capture Appliance
with Bypass and GPS

Product Manual

Firmware Version 2.09

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Introduction

PRODUCT DESCRIPTION

The IPCopper USC10G3 is a high-performance, standalone full packet capture appliance with 2 x 10-GbE ports, 4 x 1-GbE Ethernet ports and 24 TB storage.

Key features include:

- True bypass: In case of power loss or malfunction the USC10G3's ports switch into bypass mode to minimize network disruption. Bypass may also be manually engaged and disengaged through the management utility.

- GPS time synchronization: At bootup, the USC10G3 synchronizes to the broadcast GPS time for high-accuracy timestamping and indexing.

- Continuous-loop storage: <u>WARNING! The USC10G3 contains a built-in functionality that overwrites the oldest data with the newest.</u> When the USC10G3 reaches its 24 TB capacity, it starts over from the beginning, overwriting the oldest recorded data with the newest. The oldest data, once overwritten, is irrecoverable. The data stored on the unit will always be the most recently captured 24 TB of network activity.

SECURITY FEATURES

- Electronic invisibility: The USC10G3 uses neither an IP address nor a MAC address. This stealthiness increases the security of the appliance, while at the same time making installation as easy as connecting a few cables.

- Removable key: Unit will not bootup without the key.

- 20,000-bit dual encryption.

- Sealed all-metal, high-strength aluminum tamperproof enclosure.

- Encrypted access via management utility.

- Physical access control: Enable/disable retrieve mode via front panel button.

Interface	2 x 10-GbE Ethernet 4 x 1-GbE Ethernet
Memory	o 24 TB o continuous-loop storage
Bypass	Automatic and manual o Automatically engages with loss of power o For more information see page 17
Capture & Record Speeds	o Peak: 10 Gbps o Minimum Sustained: 5 Gbps @ 6 million packets / second o For more information see page 13
Data Output Format	PCAP
Encryption	o Dual o 20,000-bit key
GPS Time Synchronization	o Via removable, external antenna o Manual enable/disable o For more information see page 14
Power Supply	95 ∼ 250 VAC, 48 Hz ∼ 60 Hz
Power Consumption	o Peak: 150W o Typical: 80-100W
Environmental	Storage temperature: -20 °C to +70 °C Operating temperature: 0 °C to +30 °C*
Dimensions	o 19 in x 3.5 in x 12 in; 18 lbs
Other	o Flow control supported o Jumbo frames supported up to 9 KB

The USC10G3 may operate at slightly higher temperatures, however, care must be taken to ensure that there is at least one foot of unobstructed air space in front of the vents, to avoid the backflow of exhausted air into the unit. If placed in a cabinet, the cabinet must be ventilated.

1 - USC10G3 packet capture appliance

1 - GPS antenna

1 - Power cord

1 - USB stick, white (contains management utility)

1 - USB stick, black (contains key)*

* IMPORTANT! DO NOT INSERT THE BLACK USB KEY INTO A COMPUTER
   OR ANY DEVICE OTHER THAN THE USC10G3 WITH WHICH IT CAME.
   DOING SO MAY DAMAGE THE KEY AND RENDER IT NONFUNCTIONAL.

Installation

GENERAL INSTALLATION

1. Connect the Ethernet cables.

    ▶ Ports 5 and 6 are 10-GbE ports. Ports 1 through 4 are 1-GbE ports.

    ▶ If using inline, the traffic feeding into port 1 will exit out port 2 and vice versa. Likewise, the traffic feeding into port 3 will exit out port 4, traffic feeding into port 5 will exit out port 6 and vice versa.

    ▶ If using a SPAN/mirror port, connect to any port (of appropriate speed). Please see page 18 for information on using the management utility to switch ports into dedicated SPAN mode.

2. Firmly insert the black USB key.

    ▶ Use the black USB key that came in the box with the unit. This key will only work with the unit with which it came and cannot be used with any other IPCopper device. *Do not insert this black USB key into any other equipment as this may cause it to malfunction.*

3. Connect the power cable and flip the back power switch ON.

    ▶ Once the power switch in back is flipped to the ON position, the unit will power on and begin booting up automatically.

    ▶ During bootup, the USC10G3 receives signals from at least three GPS satellites and synchronize its clock to the broadcast GPS time. During this synchronization process, the green GPS light blinks with increasing frequency as time synchronization progresses. Depending on the reception strength, it may take up to half an hour for the unit to synchronize (for more information see page 14).

    ▶ To skip GPS time synchronization, press the RET button one time while the GPS light is blinking. GPS time synchronization may also be disabled and re-enabled through the management utility (see page 16).

Once the unit is operational, the green REC light illuminates. If the error light illuminates, please see the troubleshooting section on page 25.

INLINE VS. SPAN DEPLOYMENT

The USC10G3 provides two methods for connectivity, either inline on the wire or via a router or switch's SPAN / mirror port. Since the USC10G3 has multiple ports, a combination of inline and SPAN modes may also be employed. For more information on the USC10G3's port modes, please see page 18.

Setting up the USC10G3 inline on the wire is simple, involving the connection of either two or four or six cables (for capturing traffic on one, two or three routes). When used inline, port 1 corresponds to port 2, port 3 to port 4 and port 5 to port 6. The biggest advantage of inline mode is the higher accuracy of recording: no intervening equipment stands between the USC10G3 and the raw IP/Ethernet traffic and the unit is able to capture and timestamp the data exactly as it traverses the wire. Another benefit is that it allows the unit to act as a buffer for other networking equipment, should traffic spike.

SPAN mode allows the recording of up to six networks or network routes on one USC10G3. The drawback of using SPAN mode is that it relies on the performance of the equipment mirroring the traffic (oftentimes a switch or a router with a SPAN port) and therefore introduces uncertainty as to the accuracy of the captured activity. The intervening equipment may re-order or drop packets; when using SPAN/mirror ports, it is quite possible to have a packet traverse the switch or router, but not be mirrored and pass out through the SPAN port. Having intervening equipment between the packet capture appliance and the source of the network traffic also introduces a delay in the packets reaching the unit, resulting in inaccurate timestamping.

Lastly, you may also have a situation where the router or switch is attempting to feed data in excess of 10 Gbps through the SPAN/mirror port, since the traffic sent out through the SPAN/mirror port is an aggregate of all the traffic received and sent by the router/switch in both directions. Under peak loads, the switch/router may drop packets intended for the SPAN/mirror port should the traffic volume overwhelm the switch/router's buffer.

PLACEMENT / WHERE TO DEPLOY

The USC10G3's six ports and user-selectable port modes provide flexibility and versatility when it comes to deployment. The unit may be used to monitor from one to six separate networks or network segments. The USC10G3 may be

placed anywhere on a network, either at the perimeter, the core or points in between; it requires no additional equipment to connect when used in inline mode, since in that configuration it acts as its own network tap.

The USC10G3 captures all of the traffic that passes through it. Please note, however, that if a DHCP/NAT server (which is frequently built into consumer firewalls and routers) stands between the unit and the rest of the network or a portion of the network, the DHCP/NAT server device will mask the MAC addresses and local IP addresses of the equipment on the other side of it. If the MAC addresses and local IP addresses are needed, it would be necessary to deploy an additional packet capture appliance on the other side of the DHCP/NAT server device (for example, the DHCP/NAT server device connects to the packet capture appliance, which in turn connects to a switch; the other networked equipment/end-users would connect to the switch).

Depending on the size of your network and the type and granularity of the monitoring/recording required, if possible we recommend deploying multiple packet capture appliances throughout, precisely to capture the additional information that DHCP/NAT devices mask, as well as internal communications between computers and other devices on the network that would never make it out through the internet connection.

DEPLOYING THE USC10G3 AT A REMOTE LOCATION

If you intend to deploy the USC10G3 at a separate location and will be accessing it remotely, you may need to open UDP and TCP/IP ports on the firewall at the USC10G3's location (and possibly on any routers in between the firewall and the unit) for the utility to use to connect to the unit. Please consult your firewall's/router's documentation for information on how to do this. For more information on using the management utility to access the USC10G3 from a remote location, please see page 29.

For remote deployment it would be advisable to change the unit's retrieve mode boot setting so that the unit boots up with retrieve mode on by default (see page 34 for instructions). When retrieve mode is off, the unit will not respond to any management communications and it will be necessary to manually toggle the unit into retrieve mode by pressing the retrieve button on the unit's front panel in order to communicate with the unit.

DEPLOYMENT SCENARIOS

Since the USC10G3 requires no configuration, it can be placed pretty much anywhere on a network. Where you choose to place the unit depends on which traffic you would like to capture. Using the USC10G3 in inline mode offers the most flexibility for deployment, however, it may also be connected to a router or switch's SPAN/mirror port. Below is a small sampling of deployment scenarios.

Scenario 1.

In this scenario, the USC10G4 is placed at the network perimeter, between the internet connection and the firewall. In this location, the unit will capture all traffic originating from the internet, even the transmissions that the firewall would block, and all the outbound traffic from the network, but none of the internal network traffic.

Scenario 2.

In this scenario, the USC10G4 is placed at the network perimeter, between the firewall and the LAN. In this location, the unit will capture all traffic originating from the internet, minus the traffic blocked by the firewall, and all the outbound traffic from the network, but none of the internal network traffic.

Scenario 3.

In this scenario, the USC10G4 is placed further inside the network, inline between a workgroup's router and the rest of the LAN. In this location, the unit will capture all traffic originating from the workgroup and all traffic destined for the workgroup. Please note that in this configuration a DHCP router will obscure the local IP addresses of the workgroup's networked equipment. The unit will not be able to capture any traffic that does not leave the workgroup.

Scenario 4.

In this scenario, the USC10G4 is placed inline between a workgroup's switch and the rest of the LAN. In this location, the unit will capture all traffic originating from the workgroup and all traffic destined for the workgroup, along with all the traffic within the workgroup itself. The advantage of this setup is that the unit would be able to capture the local IP address and MAC addresses of the workgroup, since there is no DHCP router in between the unit and the workgroup members.
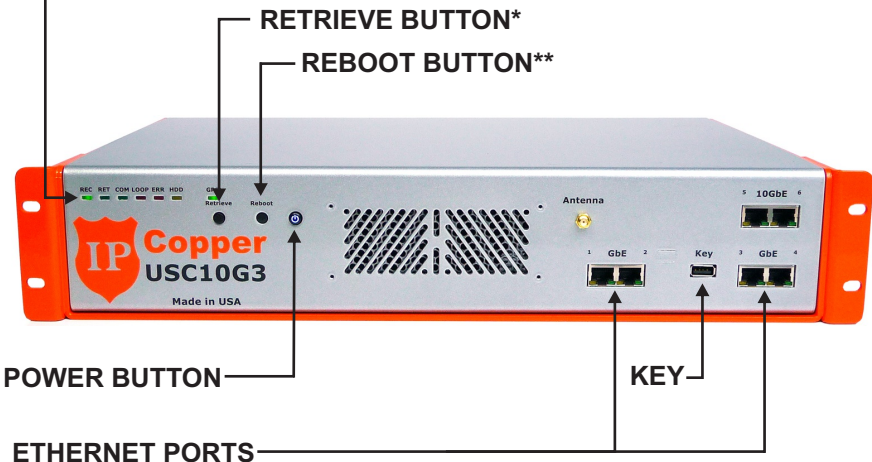
Scenario 5.

In this scenario, the USC10G4 is placed inline between a database or other type of server. In this location, the unit is able to capture and record all traffic going to and from the database/server.

Understanding the Front Panel

INDICATOR LIGHTS
- REC: illumination indicates unit is operational and ready to capture and record
- RET: illumination typically indicates that unit is in retrieve mode; also illuminates during GPS time synchronization
- COM: lights up when communicating during data retrieval and during the second stage of GPS time synchronization (see GPS Time Synchronization, page 14)
- LOOP: shines red after the initial 24 TB capacity has been reached and the unit has begun overwriting data (see Continuous Loop Storage (Overwrite), page 20)
- ERR: indicates an error (see Troubleshooting, page 25)
- HDD: indicates that the hard drive is engaged
- GPS: blinks during GPS time synchronization (see GPS Time Synchronization, page 14)

RETRIEVE BUTTON*

REBOOT BUTTON**

POWER BUTTON

KEY

ETHERNET PORTS
- ORANGE: indicates port is operating at gigabit (ports 1 - 4) or 10-gigabit (ports 5 and 6) speed
- GREEN: indicates connectivity
- NO LIGHTS: either port is in bypass mode or there is no connectivity
- 1-GBE PORTS: 1, 2, 3, 4
- 10-GBE PORTS: 5, 6

* The retrieve button has two functions. If the REC light is on, the retrieve button acts as a manual switch to enable/disable retrieve mode. If the REC light is off, all ports are in bypass mode and pressing the retrieve button switches ports 1 and 2 into inline mode.
** It takes 3-4 seconds for the unit to start reboot process after pressing reboot button.

Shutdown Sequence

STANDARD SHUTDOWN SEQUENCE

When the power button is configured with power off functionality (which is the default setting), pressing the power button initiates the shutdown sequence, during which the unit engages bypass, clears its buffers and stops recording. Please follow the steps below to avoid data loss when powering down.

1. Press the power button on the front panel. The REC light will begin blinking.
2. Wait until the REC light ceases blinking. All indicator lights will illuminate and the power button light will turn off. At this point the unit has finished clearing its buffers and stopped recording.
3. Flip the power switch on the back of the unit to the OFF position.

IMPORTANT! ALWAYS FLIP THE POWER SWITCH ON THE BACK TO THE OFF POSITION AFTER INITIATING THE SHUTDOWN SEQUENCE. If the back power switch is not turned OFF, the fan(s) will continue to run.

The shutdown sequence cannot be aborted. Once the shutdown sequence has been initiated by pressing the power button on the front panel, it must be completed as per the steps above. After the power button has been pressed, the unit will not respond to the pressing of any buttons on the front panel until the power switch in back has been toggled OFF, then ON again.

REBOOT SHUTDOWN SEQUENCE

Pressing the reboot button causes the unit to abruptly reboot, which may result in data loss or corruption. Rebooting the unit via the management utility, as opposed to the front panel button, is a safer way to reboot the unit.

When the power button is configured as reboot, pressing the power button will cause the unit to cease recording and reboot, without processing the data that was in its buffers at the time the power button was pressed. When the REC and RET lights and all port lights turn off, it is safe to turn off the power switch on the back of the unit. *Switching off the back power switch before the REC, RET and port lights turn off may cause data loss or corruption.*

Capture and Record Speeds

PEAK AND MINIMUM SUSTAINED SPEEDS

The USC10G3 provides combined peak capture speeds on its 10 GbE ports of 10 Gbps. Its four GbE ports peak at 1 Gbps.

The unit's minimum sustained capture speed is 5 Gbps at 6 million packets per second. At this rate the overhead is approximately 16 to 20 bytes per packet. Please note that the unit records the packets including the 4 byte checksum.

The maximum storage speed is 5.925 Gbps, including overhead.

UTILIZATION AND 10 GbE VS GbE PERFORMANCE

If necessary, at times of higher utilization on the 10-GbE ports the USC10G3 will sacrifice performance on the 1-GbE ports in favor of the 10-GbE traffic.

Under some circumstances, very frequent status checks (for example, more than once every few minutes) and data retrieval requests may affect performance. In those circumstances, instead of achieving a performance of six million packets per seconds, you may see a 1% reduction in performance, proportional to the frequency of the management utility's control packets.

CTRL MARKER AND PERFORMANCE

Each port has a CTRL marker, which may be turned on or off. Only the ports with this marker turned on will be able to recognize and accept management packets from the utility. Turning the CTRL marker off on the 10G ports increases their capture and record performance to their full operational capabilities; turning the CTRL marker on drops the 10G ports' performance by as much as 40% to 50%. *For best performance on the 10GbE ports, we recommend turning the CTRL marker OFF for both 10GbE ports at installation and using one of the GbE ports for management.*

The CTRL marker is enabled/disabled for each port through the management utility (see page 34). By default, the CTRL marker is ON on all ports.

GPS Time Synchronization

ANTENNA PLACEMENT AND SPECIFICATIONS

When attaching the GPS antenna, firmly screw it into place on the front of the USC10G3 without bending the cable. Once you have attached the antenna, we do not recommend disconnecting it. Repeatedly detaching and reattaching the antenna may result in damage to the connector.

Place the antenna as reasonably close to a window as possible; the closer to a window the antenna is, the better the signal reception. Elevating the antenna may improve reception, but the best placement depends on the height of the nearest window and the visibility through it to the sky.

The antenna has a magnetic base, however, we strongly advise against placing the magnetic base on the USC10G3's enclosure. Placing a magnet on the unit's enclosure may harm the internal parts and cause malfunction.

The supplied antenna type has been tested indoors with the USC10G3 and performs well. Depending on the placement of your unit, a more sensitive antenna may improve the speed of signal acquisition (regardless of the sensitivity of the antenna, having a window nearby is necessary and the closer the better).

Please use the following specifications if you elect to use your own antenna:

- ► Active GPS antenna
- ► Minimum 10 Mhz bandwidth
- ► 1.5 dB recommended noise figure
- ► 1575 MHz
- ► 50 Ω Ohm impedance
- ► 3 VDC

Note on antenna cable length: Antenna cables attenuate the signal and the longer the cable, the weaker the signal. To counteract this, we recommend using low noise cables designed for wifi / GPS applications. The longer the cable length, the thicker it needs to be to reduce noise and attenuation. The USC10G3 has been tested with cables over 75 feet in length.

GPS time synchronization takes place in three stages.

During the first stage, the GPS light on the front panel blinks slowly as the unit initially acquires the signal from three or more GPS satellites. The unit requires at least three satellites to ensure the accuracy of the GPS time synchronization (and to avoid the possibility of GPS signal spoofing).

During the second stage the GPS light continues to blink slowly and the COM light illuminates. At this stage, the system has been able to recognize the stored locations of the GPS satellites, but has not yet synchronized the time. Acquisition is almost complete once the second green (RET) light illuminates; the unit has been able to receive the necessary clock information from the three GPS satellites, but has not yet locked in on the satellites.

The USC10G3 has entered the third stage of synchronization once the GPS light begins blinking rapidly. The unit is now actively tracking the satellites and synchronization is imminent, waiting only for the computations to complete.

When GPS time synchronzation has completed, the GPS light will shine steadily and the COM light will turn off.

Generally it takes several minutes for the unit to acquire and identify the GPS signals from a cold start, as the unit first roughly figures out where it is in relation to the satellites and begins computations. These computations become finer and finer until the unit locks on the GPS time signal.

If the USC10G3 was in storage (offline) for a long period of time, it is possible for the internal clock to have drifted slightly. If so, it may take longer than usual for the GPS time synchronization to complete the first time the unit is booted up after being offline for a long period of time because the unit would need to re-synchronize its own internal indices.

In some circumstances, it may take up to half an hour for GPS time synchronization to complete. If unable to synchronize, a timer will abort GPS time synchronization after 30 minutes and the unit will finish booting up without GPS time synchronization.

FASTGPS OPTION

GPS satellites and the GPS system track time in GPS Time, rather than Greenwich Mean Time (GMT). Due to the rotation of the earth, errors accumulate over time and from time to time the committee that oversees GPS Time decides to add an extra second to GPS Time in order to compensate for these errors. These added seconds are known as leap seconds.

During GPS time synchronization, waiting for the satellites to broadcast the current leap second data may add time to the synchronization process, however, this does ensure that the synchronization takes place with the most accurate data.

FastGPS may speed up GPS time synchronization. When FastGPS is enabled, the unit synchronizes its time without waiting for the satellites to broadcast the leap second data, instead using the previously stored leap second data for synchronization. Should the satellites broadcast the current leap second data while the unit is going though the other synchronization steps, however, the unit will synchronize using the current leap second data.

When using FastGPS, the unit may synchronize to a time that is one second off of the actual GPS time (depending on when the GPS time committee last added a second and when your unit last received the leap second data).

ABORTING/DISABLING GPS TIME SYNCHRONIZATION

We strongly recommend always using GPS time synchronization, not only for accuracy, but also for coherency. When the unit is off, it is possible for the internal circuitry that keeps the lock on the GPS signal alive to fail or malfunction. When this occurs, it may affect the clock. If on the subsequent power-up GPS time synchronization is disabled, the data timestamps may not be accurate; in fact, it may create an incoherency in the data indices with either gaps or overlaps in the timestamps. Should this occur, re-synchronize the unit's time using GPS time synchronization and then run a large amount of traffic through the unit, enough to overwrite the incoherent sections. The probability of this circumstance arising is rather low, nevertheless, we do recommend using GPS time synchronization to avoid it.

You may abort GPS time synchronization during bootup any time while the

GPS light is blinking by pressing the RET button one time. This will abort the current synchronization; at the next bootup, GPS time synchronization will proceed as normal.

You may disable GPS time synchronization through the management utility (see page 34). Choose the option to change settings, then follow the instructions on the screen to toggle GPS time synchronization off. The unit will not attempt to synchronize its clocks again until you re-enable GPS time synchronization through the utility.

Ethernet Port Modes

OVERVIEW

The USC10G3 features two 10-GbE ports and four 1-GbE ports. The ports may be configured independently or in pairs via the management utility. Each port has two small indicator LEDs, one orange and one green. When illuminated, the orange light indicates that the port is operating at gigabit or 10-gigabit speed. The green light indicates connectivity. If both green and orange lights are off, either the port is in bypass mode or it has no connectivity.

> ► *For a comparison of inline versus SPAN, please see page 9.*

> ► *Please also read about the CTRL marker on page 13.*

INLINE MODE

When in inline mode, the Ethernet ports operate in pairs. Port 1 pairs with port 2, port 3 with port 4 and port 5 with port 6. Traffic entering on port 1 will exit on port 2, and vice versa. Likewise with ports 3 / 4 and 5 / 6. When one or all pairs are in inline mode, it is not necessary to designate a port for management; any port in inline mode may be used for communicating with the management utility and retrieving data unless the CTRL marker has been turned off (see CTRL Marker and Performance on page 13).

Should a malfunction or power loss occur when ports are in inline mode, the unit will automatically switch the inline ports over to bypass mode.

SPAN / MIRROR MODE

Use SPAN / mirror mode when connecting the port to the SPAN or mirror port on another piece of equipment. In this mode, the port can only receive and record data; it does not pass it through to any other port or send data out.

When in SPAN mode, a port cannot be used for data retrieval or status checks, though it is possible for the unit to receive communications from the management utility through it, provided retrieval has been enabled and the CTRL marker for the port is on. Should all six ports be in SPAN mode, to

initiate access to the unit you will need to connect a computer directly to one of the ports, switch the unit into retrieve mode and then use the management utility to switch the port into either management mode or inline mode (please note that switching one port into inline mode will also switch its partner port into inline mode). Please note that if the CTRL Marker is OFF, the port will be unable to recognize any communications from the management utility.

If you change a port from either inline mode or bypass mode to span mode, its partner port will automatically switch into management mode, however, you may manually change that second port to SPAN mode, if desired. For example, if ports 1 and 2 were previously in inline or bypass mode and you change port 1 to SPAN mode, port 2 will automatically switch to management mode.

BYPASS MODE

Any pair of ports in inline mode will automatically switch over into bypass mode, should the unit malfunction or lose power. Bypass mode may also be engaged and disengaged manually through the management utility. It is possible to have all pairs of ports manually switched into bypass mode, however, this would make it impossible for the management utility to communicate with the unit (should all ports be in bypass mode, the REC indicator light will be off). In this circumstance, pressing the retrieve button will switch ports 1 and 2 into inline mode.

MANAGEMENT MODE

Management mode is useful for communicating with the unit when the other ports are in SPAN mode. When in management mode, it is possible to set both an IP address and a MAC address for the port (using the management utility). The IP address and MAC address may be any of the user's choosing and is not significant to the functions of the appliance.

When in management mode, a port cannot be used for capturing data, but only for communicating with the management utility. Even when in management mode, the appliance maintains a stealthy profile and will not respond to any attempts to elicit a response (other than ARP requests) unless it comes from the management utility.

Other Features and Functions

Data may only be retrieved from the USC10G3 using the appliance's management utility (specifically, the edition of the utility that came in the box with the unit). For more information on the management utility, see page 22.

When retrieving data from the unit, it is necessary for the unit to be in retrieve mode. If the appliance is not in retrieve mode, it will not answer any attempts at communication from the management utility. When the appliance is in retrieve mode, the green RET indicator light on the front panel illuminates. To switch the unit into retrieve mode, press the retrieve button on the front panel.

Out of the box, units boot up with retrieve mode ON, however, through the management utility you may elect to have retrieve mode either ON or OFF by default. If you choose to have retrieve mode on by default, the unit will boot up in retrieve mode and pressing the retrieve button will turn retrieve mode off. Regardless of retrieval status at shutdown, at bootup the unit will revert to the chosen default setting.

When downloading data, by default the management utility downloads the data from all ports for the specified date/time range and IP/MAC address and the resulting PCAP file would contain the packets from all ports in the same file. It may not, however, be desirable to have the data from all ports combined. When downloading data, the user may identify the specific port(s) whose activity is desired (for example, from just port 1 or ports 1 and 2 and so on).

Filters may be applied to data downloads, including those for date and time range, IP address and MAC address. Users may also choose to have the downloaded data broken into separate smaller files, for example, limited to a size of 1 GB.

CONTINUOUS LOOP STORAGE (OVERWRITE)

The USC10G3 features continuous-loop storage with overwrite. As the unit records and after it has passed its first 24 TB of data, it will overwrite the oldest captured data with the newest. When this occurs, the overwritten data become

irrecoverable. To avoid losing important data, it is recommended that you download data from the unit on a regular basis.

The unit also keeps internal logs of events. Just as with the captured packets, the event log data is overwritten as the corresponding data, date- and time-wise, is overwritten.

If you require a packet capture appliance that does not overwrite the oldest data, forensic-class models are available which permanently record data to one-use storage (these currently include the USC1030 with 1 TB storage and the USC2030 with 2 TB storage).

FLOW CONTROL

The USC10G3 is equipped with automatic flow control, for situations where the unit is operating inline and it appears that the unit may run out of buffer space. In that circumstance, the unit may ask the network counter-party to hold traffic for a short period of time, if it can, to allow the unit to catch up and free up some buffer space. This is typically not an issue due to the USC10G3's high speed and large buffer.

This feature comes in handy when you have equipment on one side or the other of the unit that is unable to cope with the level of traffic. In that circumstance, the IPCopper unit may act as a large network buffer and moderate the network traffic to reduce the chances of the adjacent equipment losing packets.

AUTO-NEGOTIATION (PORT SPEED)

All ports on the USC10G3 auto-negotiate their speed to match the speed of the adjacent network equipment.

Management Utility

The USC10G3's management utility is an easy-to-use menu-driven interface for securely communicating with the unit. Each USC10G3 comes in the box with a specific utility file "mated" to the particular unit with which it came. The USC10G3 utilities are not interchangeable; an individual USC10G3 may only be accessed by the specific utility with which it came.

The management utility is the only interface available for any and all communications with the unit, therefore we recommend that you keep a copy of your USC10G3's management utility in a safe place.

Using the management utility is very straightforward, very much like a simple question and answer session. Please visit our website at www.ipcopper.com to view videos demonstrating the menu-driven management utility.

ADMIN AND USER PASSWORDS

Out of the box, both admin and user passwords are blank by default. Only the admin can change passwords. Passwords are limited to a length of 12 characters, and should conform to hex-decimal format (you may use any number 0 - 9 and any letter from A - F).

IMPORTANT! Do not lose the admin password. To reset the admin password requires physical access to the unit and it would be necessary to contact IPCopper tech support for assistance. IPCopper tech support would not be able to remotely reset the password, however, they can provide specific instructions on how the reset the password. *Please note that in some circumstances, it may be necessary to send the unit to IPCopper tech support to have the password reset.*

When checking status, retrieving data or changing settings, the interface will prompt the user for a password. The unit will check the entered password against those set for the admin and user and grant privileges for that session based on which one it matches. Please note that if the password entered matches neither admin nor user, the unit will not respond. This is a security

feature to protect the unit against brute force attacks. Should you enter the incorrect password, you will need to relaunch the management utility and start over.

Entry of the admin password allows the user to change any settings, including the passwords for both admin and user, as well as to run status checks and data downloads.

Entry of the user password only allows status checks, unless the admin has allowed additional privileges, such as changing settings or downloading data.

STATUS PAGE

Running a status check yields a status page with a number of statistics on the functioning of the unit, many of which are fairly self-explanatory.

- Unit Name and Location: These are user-designatable IDs. They are informational only, for convenience in managing multiple IPCopper units and have no bearing on the unit's or the utility's operations.

- Overwrite status: If OFF, the unit is still on its first loop of recording, has not yet reached capacity and is not yet overwriting any data. If this indicator is ON, it means that the unit is beyond the first recording loop and is now overwriting the oldest data with the newest. Once overwrite is on, the utilization percentages indicate the percentage that has been recorded since the end of the last "lap." For example, if overwrite is off and utilization is 5%, only 5% of capacity has been utilized. If overwrite is on and utilization is 5%, 100% of capacity has been utilized, however, 5% of that has taken place since the beginning of the current loop.

- Indexed data: The status page shows indexed data, that is, data that has already been indexed. The USC10G3 automatically indexes the data as it records it, however, under normal operations there is always a slight lag between the last indexed date and time and the current date and time. Normally you should see only one big index covering an entire, continuous time period, however, it is rare but possible to have additional indexed periods with other time intervals. This circumstance should not occur as long as GPS time synchronization is

used to ensure that the unit's clock keeps counting forward in time.

TIPS FOR RETRIEVING DATA

- If All Ports in SPAN Mode: When all ports are in SPAN mode, you cannot specify a management IP address during the utility's retrieval process. Instead, when prompted, answer that you do not know the IP address to use and the subsequent questions will lead you through the rest of the process.

- Offset: When retrieving data while the unit is in operation you may specify an "offset" in order to avoid trying to retrieve data that is currently in the process of being overwritten. By default the offset is set to 10 GB, which means that the retrieval will not retrieve any data within 10 GB of the earliest data on the machine. In most cases 10 GB is a sufficient offset, however, if your unit is capturing and recording at higher than average speeds, then a larger offset, as much as 100 GB, may be necessary. Should you attempt to retrieve data that is in the process of being overwritten, the retrieval request will abort and you will need to begin again with a new retrieval request.

- If you need to retrieve large chunks of the earliest recorded data on the machine, to avoid running into an issue with the offset and overwrite (see above) it would be advisable to remove the unit from operation and then retrieve data via a port set to management mode. By doing this you can ensure that the unit is not capturing any data during the retrieval process (and therefore, not overwriting).

- Please also see CTRL Marker and Performance on page 13. Ports with the CTRL marker turned off will not be able to recognize, accept or act on any management packets sent from the management utility, including data retrieval requests.

Troubleshooting

The tips below should help resolve most issues that you may experience with your IPCopper packet capture appliance, but we are here to help if you need further assistance.

Even if your appliance is no longer within the warranty period, please contact us with any questions or concerns you may have about the operation of your USC10G3. The email address for IPCopper tech support is support@ipcopper.com. When contacting tech support, please include your unit's serial number, the model number and a description of the problem. You would receive an automated acknowledgment that your email was received. Most emails are answered within 24-48 business hours, if not on the first day.

Please see the back page of this manual for additional contact information.

ERROR LIGHT ILLUMINATED

1. Press the reboot button to reboot the unit. In most cases this should clear the error.
2. Shut the unit down, remove from power and re-connect to power using a different power cord and different outlet, then reboot the unit.
3. Change all ethernet cables connected to the unit, then reboot.
4. Disconnect all ethernet cables, reboot the unit and observe whether the error light persists.

If the error light persists after several attempts to reboot the unit, changing cables and changing the power sources as suggested above, there may be a problem with the unit's hard drive or other internal component. Please contact IPCopper tech support for more assistance.

UNABLE TO CONNECT TO INTERNET

1. Is the error light on? If yes, see section above.
2. Check the ethernet cables to confirm that they are firmly connected at both ends. Also confirm that the unit is connected to power and the

power switch in the back is on the ON position.

3. Check that there are no loose network cables between your computer and the unit.

4. Check the status lights on your modem, to confirm whether your internet connection is operational.

5. If the unit has just been rebooted or is booting up for the first time after a power outage, confirm that the USB key is firmly inserted in the USB slot. The USB key is necessary for the unit to boot up and if the USB key is missing, the unit will not be able to boot up.

6. Check the green and orange Ethernet port lights. If they are off, it may indicate a lack of connectivity. See points 2 and 3 above.

7. It is possible that the unit's ports are either in management mode or SPAN mode. If so, you would not be able to connect to the internet through the unit. In order to connect to the internet or other parts of the network through the unit, the unit must be in either inline or bypass modes. For more on the different Ethernet port modes, please see page 18.

NOTHING HAPPENS WHEN UNIT CONNECTED TO POWER, NO LIGHTS

1. Confirm that the power cord is firmly connected at both ends and the power switch on the back is in the ON position.

2. Toggle the power switch on the back OFF, wait a few seconds, then toggle back to the ON position.

3. Use a different power cord and/or electrical outlet.

4. Try using a surge protector or UPS (uninterruptible power supply). Or, if already using, try using a different one.

If none of the above makes a different, please contact IPCopper technical support for further assistance. Please note that if you have recently experienced power fluctuations, spikes or outages, such as those due to a storm, some of the unit's internal components may have been affected. We highly recommend that IPCopper appliances always be connected to power via a surge protector or UPS for protection against power spikes, surges and other fluctuations in the electrical grid.

Power Supply Fuse

A replacement power fuse for the power supply may be found behind the small door in the power supply housing.

Additional Resources

General . . . . www.ipcopper.com

Hardware Troubleshooting . . . . www.ipcopper.com/support.htm

Other Support. . . . . www.ipcopper.com/support.htm

Warranty Claims . . . . www.ipcopper.com/warranty.htm

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