RTS

VLINK Virtual Matrix User Guide

VLink Virtual Matrix - RTS

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04/07/20 14:09:26 - VLink Virtual Matrix version:  5.6.0-1 (Windows x64)
04/07/20 14:09:26 - Self-signed SSL Certificate generated
04/07/20 14:09:33 - [License] Licensed to RTS until 05/05/2019
04/07/20 14:09:33 - [License] System Identification Code: 0279-9AB0-0C13-90BE
04/07/20 14:09:33 - [License] Licensed for 2 connections
04/07/20 14:09:33 - Server configuration file:  "C:\Program Files\RTS\VLink Virtual Matrix\SystemConfiguration.txt" ...  # of Configured Users: 49, System Audio Sample Rate: 48 KHz
04/07/20 14:09:33 - Server ready for VLink connections ... 169.254.234.40:1000
04/07/20 14:09:33 - Server ready for VLink connections ... 192.168.56.1:1000
04/07/20 14:09:33 - Server ready for VLink connections ... 192.168.2.28:1000
04/07/20 14:09:33 - Server ready for SIP connections ...  IP Address: 192.168.2.28:5060
04/07/20 14:09:33 - [License] ***ERROR***: License has expired!!!
04/07/20 14:09:33 - Server ready for HTTP connections ...  IP Address: 192.168.2.28:80
04/07/20 14:09:33 - Server ready for HTTPS connections ...  IP Address: 192.168.2.28:443
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U.S. Patent #'s 8660039, 8942141, 9357077

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INTRODUCTION

ABOUT VLINK

VLINK is a non-blocking, all software multi-channel/multi-access Intercom over Internet Protocol based on a dedicated server, multiple client architecture. VLINK is engineered for professional, mission critical communications in broadcast, production, military, aerospace, and government applications.

This short document provides information on how to install, configure, and use the VLINK Virtual Matrix server software.

SYSTEM REQUIREMENTS

OPERATING SYSTEM REQUIREMENTS

The Virtual Matrix can be installed on virtually any supported Windows based operating system however Windows 10 Professional x64 or Windows Server 2016 x64 are highly recommended.

MEMORY REQUIREMENTS

The memory requirement for the Virtual Matrix are very minimal and system size does not realistically need to be considered. It is recommended to use 8GB of memory with any modern OS which will also provide sufficient resources for operation of the Virtual Matrix.

STORAGE REQUIREMENTS

The storage requirements for Virtual Matrix in the standard configuration are not substantial but some incremental storage space is required for Activity/Debug Logs. In the standard configuration, a minimum of a 128GB SSD is recommended although a 256GB SSD is preferred. The SSD is specified only for reliability.

If the system is configured with audio recording, additional diskspace may be required. Recording in WAV file format, at the default audio sampling rate of 32KHz, would require 225 MB per recording hour but after MP3 compression will likely be 10% of that value. As an example, if recording 1 channel with active audio for 5 hours per day for an entire year, it would require and estimated 40GB of disk space. When the system is configured with audio recording, a TB drive is recommended.

COMPUTATIONAL REQUIREMENTS

The computational requirements for the Virtual Matrix depends on the number of active connections to the system and how the system is being utilized. In a "Heavy" use configuration, there would be many users simultaneously monitoring multiple audio sources including multiple conferences with large groups of users. In a moderate use configuration, there would be many users simultaneously monitoring single sources or conferences with smaller groups of users. In a "Light" use configuration, there would some users monitoring audio sources and conferences while other users just periodically communication with specific other users. To determine the computation requirements each of the use cases is assigned a value for the '# of Connections' relative to the '# of CPU Cores' as follows:

# of Connections	# of CPU Cores		
	Heavy	Moderate	Light
	50	75	100
100	2	1	1
200	4	3	2
300	6	4	3
400	8	5	4
500	10	7	5
600	12	8	6
700	14	9	7
800	16	11	8
900	18	12	9
1000	20	13	10
1100	22	15	11
1200	24	16	12

The CPU itself must have an average CPU benchmark (aka CPU Mark per PassMark) of approximately 1250 per core. If the CPU does not meet this criteria, the data provide must be scaled appropriately.

For reference, the standard server provided by RTS has an Intel Core i7-8700 with 12 cores and a [PassMark](#) benchmark of 15222 or an average of 1268 per core. With the above recommendations, the server can support 600+ connections in a "Heavy" use configuration, 900+ connections in a "Moderate" configuration or 1200+ connections in a "Light" use configuration.

Additional factors effecting computational requirements outside the scope of this document would be the co-location of the Device Interface with a Dante Virtual Sound card on the same server as the Virtual Matrix.

INSTALLATION

Locate the VLINK Virtual Matrix setup application, typically named 'VLINK_Virtual_Matrix_Setup.exe,' that was provided either electronically or on CD.

Run the installer and follow the prompts.
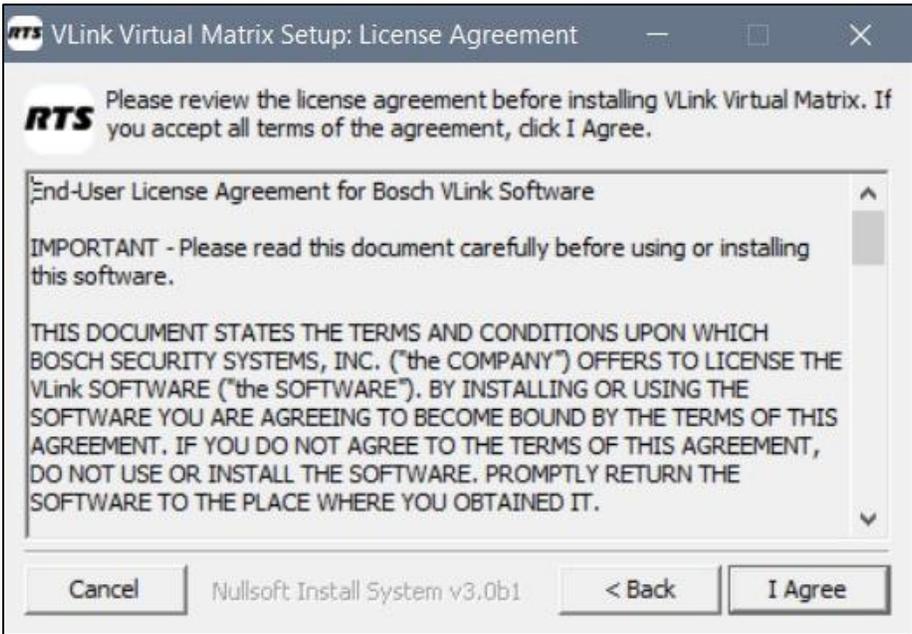
You will need to accept the License Agreement to install the software.
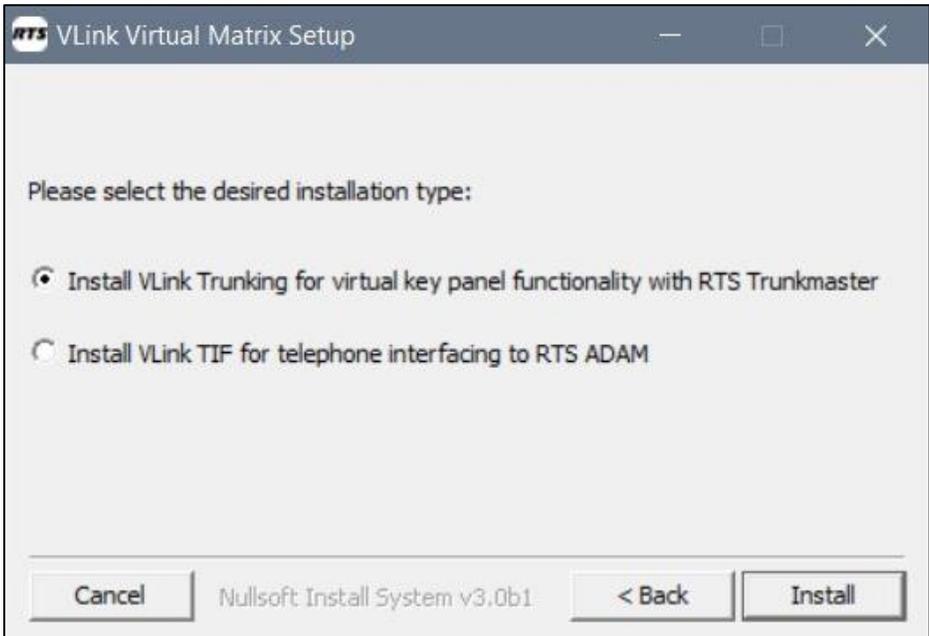
Select your desired VLINK version. If you are reinstalling or updating VLINK and there is an existing configuration file in the C:\Program Files\RTS\VLink Virtual Matrix directory you will not see this prompt.

During the installation process you will be asked if you want to install the VLINK Virtual Matrix to run as a service or application. Servers should run VLINK as a service
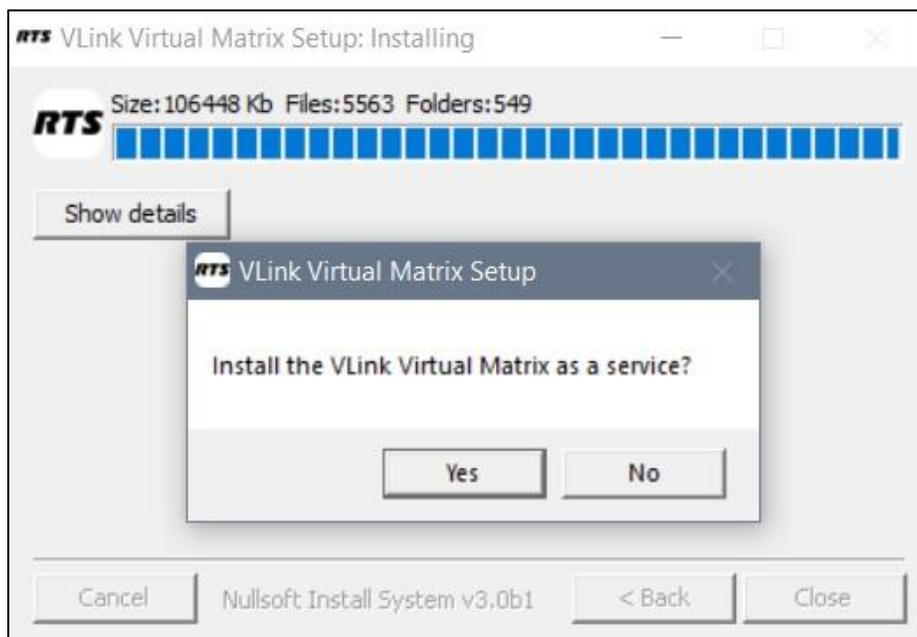
To open the VLINK Virtual Matrix once installed click on your 'VLINK Virtual Matrix' shortcut icon on your desktop or click on your start menu and select 'All Programs.' Find 'RTS and select 'VLINK Virtual Matrix.'

Note, you can run the VLINK Virtual Matrix before licensing but will not be able to connect Control Panels or Device Interfaces.

LICENSING

To license your VLINK System you need to acquire a valid license file from RTS. To do so you must provide RTS with your unique 'System Identification Code' generated automatically when you install the VLINK Virtual Matrix. The 'System Identification Code' is a unique value specific to the computer on which the Virtual Matrix was installed and is not transferable to any other computer. If the server you are running the VLINK Virtual Matrix on has dual network cards make sure the correct one is chosen before sending the system identification code as it is dependent on the network card being used. You can obtain the 'System Identification Code' either by:

1) Log into the VLINK System Administration Application and in the upper left side of the main window click the '⬚' icon next to 'System Information.' Note, the VLINK System Administration downloads and installs automatically with the VLINK Virtual Matrix ready to connect with the default login name and no password required. *Refer to the VLINK System Administration User Guide for detailed instructions on its use; or*

2) Observing the error message displayed in the VLINK Virtual Matrix main window ('ERROR: No Valid License file … System Identification Code:') which is followed by your 16 digit system identification code

```
06/12/16 18:36:52 - VCOM Virtual Matrix version:  4.3.0-33 (Windows x64)
06/12/16 18:36:58 - [License] ERROR: No Valid License file ... System Identification Code: A7D6-3939-95B3-2F9E
06/12/16 18:36:58 - Server configuration file:  "C:\Program Files\Intracom\VCOM Virtual Matrix\SystemConfiguration.txt" ...  # of Configured Users: 41, System Audio Sample Rate: 32 KHz
06/12/16 18:36:58 - Server ready for VCOM connections ... 192.168.1.14:1000
06/12/16 18:37:00 - Server ready for HTTP connections ...  IP Address: 192.168.1.14:80
06/12/16 18:37:02 - [admin]: Administrator login ...  Version: 4.3.0-11 (Windows x64),  IP Address: 192.168.1.14:56715
```

Once you locate your system identification code email, fax, or call it into your VLINK sales representative so a license file can be provided. When you receive your license file do one of the following:

1) Log into the VLINK System Administration Application and in the upper left side of the main window click the '⬚' icon next to 'System Information.' Then click the 'Upload License File' button. *Refer to the VLINK System Administration User Guide for detailed instructions on its use*; or

2) Copy the file to the same directory of the VLINK Virtual Matrix executable, typically C:\Program Files\RTS\VLINK.
Note: If the server is being installed for failover purposes no license is required.

Once the license file is installed, the VLINK Virtual Matrix will be ready to accept connections under the default configuration for 40 users consisting of 20 guest users that work using the guest template, 10 VCPs set for Windows Desktop, and 10 VDIs set for 4 wire interfaces.

The guest template allows for users to use their own user name for logging into the VCP on any supported device using the password of "guest". This is useful during temporary/demonstration in which you can assign the necessary selectors for the event, give the users the Virtual Matrix IP address, and the users can use their own user name with the password of "guest".

The 10 preprogrammed "Panels" all have the user name of "panelxx", where xx= the associated number of the panel 01-10. For example, Panel #1 would use "panel01" as the user name. All panels do not have a password; so leave this blank when signing into the Virtual Matrix from the VCP.

The 10 preprogrammed "VDIs" are setup for a 4-wire interface. Like the aforementioned panels, the VDIs use "ioxx", where xx= the associated number of the

VDI 01-10. The VDIs also do not have a password, so leave this blank when signing into the Virtual Matrix from the VDI.

OPERATION

The VLINK Virtual Matrix requires no user interaction during operation.

During operation the logging feature in the main window displays a time stamped entry for many system events include client connections/disconnections and selector activations.

```
06/12/16 18:36:52 - VCOM Virtual Matrix version:  4.3.0-33 (Windows x64)
06/12/16 18:36:58 - [License] ERROR: No Valid License file ... System Identification Code: A7D6-3939-95B3-2F9E
06/12/16 18:36:58 - Server configuration file:  "C:\Program Files\Intracom\VCOM Virtual Matrix\SystemConfiguration.txt" ...  # of Configured Users: 41, System Audio Sample Rate: 32 KHz
06/12/16 18:36:58 - Server ready for VCOM connections ... 192.168.1.14:1000
06/12/16 18:37:00 - Server ready for HTTP connections ...  IP Address: 192.168.1.14:80
06/12/16 18:37:02 - [admin]: Administrator login ...  Version: 4.3.0-11 (Windows x64),  IP Address: 192.168.1.14:56715
06/12/16 18:38:16 - [License] Licensed to Gautam until 07/08/2017
06/12/16 18:38:16 - [License] System Identification Code: A7D6-3939-95B3-2F9E
06/12/16 18:38:16 - [License] Licensed for 100 connections
06/12/16 18:38:16 - [SNMP] Failed to initialize SNMP interface
06/12/16 18:38:16 - Server ready for SIP connections ...  IP Address: 192.168.1.14:5060
06/12/16 18:38:35 - [admin]: Administrator logout
06/12/16 18:38:35 - [admin]: Administrator login ...  Version: 4.3.0-11 (Windows x64),  IP Address: 192.168.1.14:57736
06/12/16 18:38:35 - [admin]: Administrator logout
06/12/16 18:38:35 - [admin]: Administrator login ...  Version: 4.3.0-11 (Windows x64),  IP Address: 192.168.1.14:57737
06/12/16 18:38:36 - [admin]: Administrator logout
```

VLINK is configured dynamically using the VLINK System Administration application which is installed with the VLINK Virtual Matrix. It can also be installed and run on any client-side work station. To open the VLINK System Administration application, click on your 'VLINK System Administration' shortcut icon on your desktop or click on your start menu and select 'All Programs.' Find 'RTS' and select 'VLINK System Administration.'

The default master login name is 'admin' and there is no password configured. Once logged in, this can be changed.

Refer to the VLINK System Administration User Guide for detailed instructions on how to configure VLINK.

OPERATING AS A SERVICE

The VLINK Virtual Matrix is provided both as an 'application' and as a 'service'. An application is run in the foreground and is visible to the user. A service is run in the background and is invisible to the user. While running the application is advantageous to use during initial setup and configuration, running as a service is preferable as it can never be inadvertently closed and the service will automatically restart in the case of an environmental power failure.

To install the Virtual Matrix as a service, open a Command prompt and navigate to the installation directory of the Virtual Matrix (typically C:\Program Files\RTS\VLINK). From this directory type 'VirtualMatrixService install'. The Virtual Matrix server will automatically be started. To view the operating status of the Virtual Matrix service, open the Services application from the Windows Control Panel.

FAILOVER CAPABILITY

OVERVIEW

In any mission critical communications system it is imperative to have built in-redundancy. VLINK supports this function with a Failover capability. Failover by definition is the ability to automatically switch over from a primary working server to a secondary backup server should there be any catastrophic failure in operation of the primary server or its associated network.

IMPLEMENTATION

In the primary server, the IP address of the secondary server is configured. When the primary server starts, a connection to the secondary server is immediately established. Through this connection the primary server shares its licensing information to the secondary server so that individual licensing for the secondary server is not required. Additionally, the primary server conveys any operational changes to the system configuration to secondary server in real time so that the system configurations remain synchronized. This connection will remain active as long as both servers are running. If this connection is lost, the secondary server will immediately assume it is an active server allowing VLINK clients to connect. However in some cases even if the connection is not lost, the complexities of some network failures may still warrant the secondary server becoming the active server.

When any VLINK client logs into the primary server, the secondary server IP address is automatically provided to it.   In the event that communications with the primary server is lost, the client will automatically attempt to connect to the secondary server. If the secondary server is available and active, the VLINK client will log into the secondary server.

Once the secondary server becomes the active server, switching back to the primary server **generally** will require a manual authorization as the condition that caused the failover would need to be properly evaluated to ensure there is no possibility for re-occurrence of that event which would unnecessarily disrupt active communications. The manual switchover can be controlled through the System Administration application.

FAILOVER CRITERIA

In normal operations, the primary server is always the active server. In general as long as the communications link between the primary and secondary server is connected, the primary server will remain as the active server. When a server is not the active server, logins will not be allowed.   There are many different scenarios that can result in a failover event. The most common are as follows:

Communication link between primary and secondary servers lost due to primary server failure

In this simplest scenario, the secondary server would recognize the loss of the primary server and immediately become the active server. All clients would also recognize the loss of the primary server and would immediately reconnect to the secondary server.

Communication link between primary and secondary servers lost due to failure of network infrastructure

In this scenario, the secondary server would recognize the loss of the primary server and immediately become the active server. Since the primary server is still running, it too would also still consider itself to be the active server. However, if the network failure also resulted in the simultaneous loss of the majority of connected VLINK clients the primary server will deactivate itself forcing all remaining clients to connect to the secondary server.

Communication link between primary and secondary servers is not lost but partial failure of network infrastructure

In this scenario, the partial network failure may result in the loss of a large portion of the VLINK clients. In this case the primary server will inform the secondary server to activate allowing connections to be made. If the secondary server reports the client connection were established the primary server will deactivate itself forcing all remaining clients to connect to the secondary server.

OTHER CONSIDERATIONS

Many SIP clients also support a failover server however the IP address of the secondary server often must be manually configured.

The primary and secondary servers should never be co-located so as to eliminate the risk of simultaneous server failure due to environmental issues.

SUMMARY

The VLINK Failover support is an integral part of any mission critical communications solution. While its operation will never be visible to the end user, it availability in the case of an unforeseen catastrophic primary server failure will quickly restore communications capability.

SUPPORT

Visit our web site at www.rtsvlink.com for general information.

Email us at rts.customerservice@us.bosch.com for questions not addressed in the sections above or call our technical support hotline at (888) 318-6187.

APPENDIX: **Network Bandwidth Requirements Guide**

The network bandwidth requirements must be carefully analyzed to ensure proper bandwidth is available at any point where multiple clients will share the same physical connection point. The most obvious connection point where this is critical is at the server where bandwidth requirements will be the sum of the requirements of every possible client. The least obvious connection point where this is also important occurs when multiple remote clients in one physical location need to access the server in another physical location as the bandwidth requirements for the connection between these two points will be the sum of the requirements for all remote clients.

To determine the bandwidth requirements it is necessary first to determine the network bandwidth utilization per client connection, which is indicated below for the various audio sample rates that can be configured.

Audio Sample Rate	Data Rate (Kbps) [ATS=20ms*]	Data Rate (Kbps) [ATS=40ms*]	Data Rate (Kbps) [ATS=60ms*]	Data Rate (Kbps) [ATS=80ms*]	Data Rate (Kbps) [ATS=100ms*]
8 KHz	32	23.6	20.8	19.4	18.56
16 KHz	44.8	36.4	33.6	32.2	31.36
32 KHz	46.8	38.4	35.6	34.2	33.36

* ATS = Audio Time Slice per packet which controls how many 20ms audio frames are transmitted within a single UDP packet. As each UDP packet requires a fixed amount of overhead, the more frames sent at the same time, the less the UDP overhead which conserves network bandwidth. Conversely, the more audio frames sent per transmission, the greater the system latency and the potential audible consequence of a lost packet. The default is 20ms.

To determine server bandwidth requirements, first determine maximum potential bandwidth utilization by multiplying the number of clients (users and devices interfaced) by the Data Rate associated with appropriate Audio Sample Rate for the configured Audio Time Slice per packet. The product is the bandwidth required if every client were to receive audio simultaneously (maximum download bandwidth requirement) and also the bandwidth required if every client were to send audio simultaneously (maximum upload bandwidth requirement). In a typical system, the maximum download bandwidth requirement must be allocated for, as several system functions can require simultaneous audio transmission to all clients. The maximum upload bandwidth requirement however will realistically never be achieved as it is not feasible that all audio sources in a system would be active simultaneously since the result would be inaudible. As such the upload bandwidth to be allocated must be made based on the estimation of the number of simultaneous active audio sources noting that inactive audio sources will have no bandwidth requirements.

GLOSSARY

Audio Sampling Rate: How many times per second an analog audio waveform is digitally sampled, i.e. takes a "digital snap shot" to create a digital representation. The more samples taken, the higher the fidelity.

Automatic Gain Control (AGC): An adaptive system where the average signal level is used to adjust the gain to an appropriate level for a range of input signal levels. AGC effectively reduces the volume if the signal is strong and raises it when it is weaker.

Client: A VLINK specific term to refer collectively to either a Control Panel or Device Interface.

Control Panel: VLINK's client-side GUI enabling users to conduct communications using color coded selectors which represent audio/voice channels.

Device Interface: VLINK's client-side software application that bridges VLINK with multiple external communications systems.

IFB: An abbreviation of Interrupt Foldback or Interrupt Feedback. It is sometimes referred to as PI (Program Interrupt). In radio and television broadcasting IFB serves as a voice cueing mechanism for on-air talent. The talent listens to a program audio signal which can be interrupted by the voice of a production person (such as a director or producer) for the purpose of giving instructions to the talent regarding the show in progress. This is seen by a television viewer as the earpiece that a news announcer wears in the ear.

ISO: A high level intercom function by which a temporary and private communications link is established between an operator who is located at an intercom control panel and another operator. The derivation of the term ISO is from the word isolate. The function is valuable wherever a short term private exchange is required between two operators who are normally sharing the conversation required to accomplish a group activity. When any two people need to talk together without interfering with or being heard by anyone else, ISO is the function required. The most common application is that of a video control operator and a television camera operator.

System Administration: VLINK's client-side system administration application which allows for dynamic configuration from any workstation or the server hosting the Virtual Matrix.

Server: Used interchangeably with "Virtual Matrix," VLINK's server-side audio summing/mixing engine.

SIP: Session Initiation Protocol (SIP) is a widely adopted signaling protocol for Internet conferencing, telephony, presence, events notification and instant messaging. By supporting SIP, VLINK can readily interface with many commonly used IP phones, IP phone systems, and other SIP-compliant devices.

VLINK: A non-blocking, all software multi-channel/multi-access Intercom over Internet Protocol (IoIP) based on a dedicated server, multiple client architecture. VLINK is engineered for professional, mission critical communications in broadcast, production, military, aerospace, and government applications.