



## THE GATELINK API

Enhanced service development on the  
I-Link real-time VoIP network

## INTRODUCTION

Developing automated services for telephone delivery has always been a time and capital intensive exercise. Because the telecommunications industry has never offered an equivalent to the hosting services now provided by Internet ISPs, or a universal development tool such as HTML, content development has been inseparable from delivery system engineering. Aspiring service providers have had to write new applications to multiple hardware operating systems, design and build their own service platforms, connect those facilities to a network with expensive leased bandwidth, and assume responsibility for end-to-end compatibility and performance. New services have routinely burned years of engineering time and million dollar capital budgets en route to market.

Now there is a vastly simpler, faster and more affordable alternative. I-Link Incorporated has built a nationwide real-time IP network specifically engineered for high quality voice transmission and designed from the outset as a platform for enhanced communication services. This 100 percent software switched network provides all the essential functions and support services of telephony as callable functions of the network operating system. An easy to use API, GateLink, allows application logic to operate against the combined resources of the entire network, without directly addressing any individual component or hardware. For the first time in telecommunications history, service developers have a programming environment that renders network operations transparent, and effectively separates content development from delivery system engineering.

By developing new services with the GateLink API and hosting them on the I-Link network, providers can reduce development time from years to weeks and eliminate the upfront capital expense of server platforms and access bandwidth. This paper describes the GateLink API, the I-Link network and the revolutionary effect they will have on the speed and cost of application development.

## INSIDE THE I-LINK NETWORK

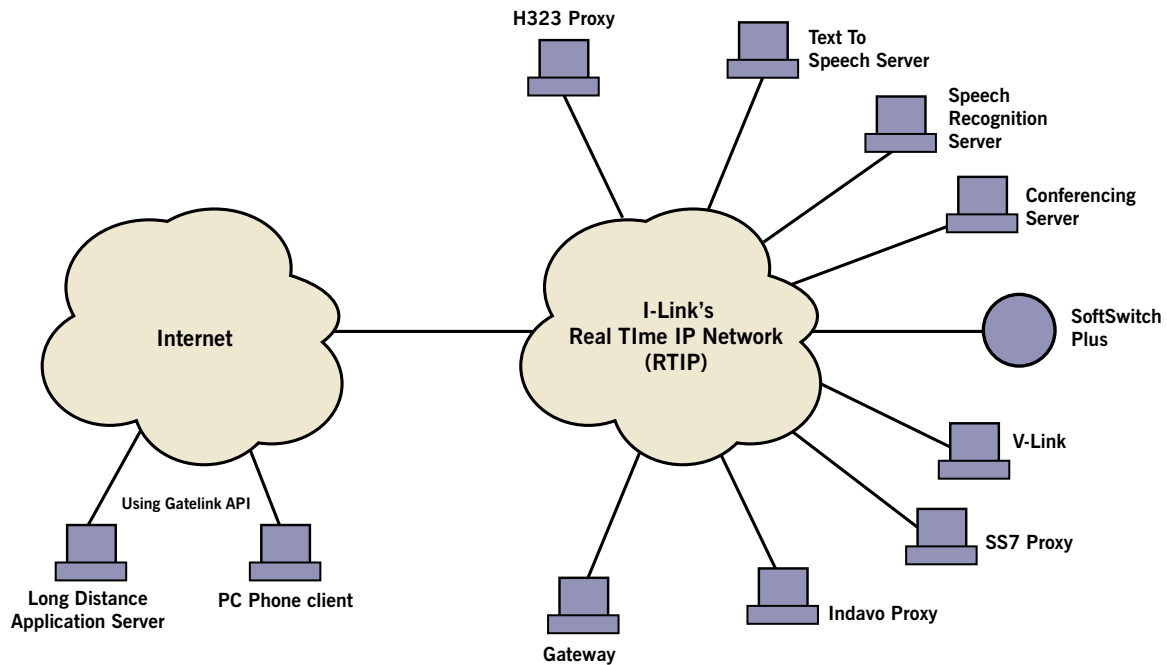
The I-Link network is a real-time VoIP network designed to provide reliable, high-quality voice transmission and a flexible, scalable platform for enhanced communication services. It is described in more detail in a separate publication entitled The I-Link Real-Time IP Network. All traffic, including voice, fax, data, video, and control signaling is carried as IP packets using a lightweight, extensible

setup protocol, Internet Media Control Protocol (IMCP). In order to allow maximum scope for technical evolution and to optimize the network as an application server platform, a three-layer design strategy has been employed.

**The physical network layer** includes all hardware necessary to originate and connect calls in an IP environment, primarily industrial routers and Pentium class PCs. PC switches located at the network periphery are equipped with telephony network cards and DSP boards. All other servers and routers attach solely to the internal network via high speed Ethernet connections. In addition to switching and routing equipment, the network provides a variety of centralized media services including call conferencing, fax store and forward, speech recognition and text-to-speech conversion. All these resources are hosted on affordable Pentium servers with Ethernet connections. As of mid 2000 the I-Link network comprises 11 major hubs and more than 2700 points of presence, providing coast-to-coast domestic and international service.

**The logical services layer** is SoftSwitch Plus™, the operating system of the I-Link network. SoftSwitch organizes the network's physical resources and defines the functions of each component. It contains all the logic required for call set-up and connection, protocol translation, signal processing, routing, capacity management, and failover. SoftSwitch controls all resource allocation across the network and creates the session detail records used for billing. Together with the physical resource layer, SoftSwitch provides all the functionality of a conventional circuit-switched telephone system as software defined features of a distributed IP network.

**The application service layer** is the hosting environment on which higher level enhanced communication service logic is deployed. One example is I-Link's own V-Link™ service, an integrated personal communications service that brings together phone, fax, pager, wireless, voicemail and e-mail at a common access point that users can reach anytime, from any touch tone phone. V-Link provides a user customizable array of features including one number follow-me, universal in box, caller screening/call whisper, on-the-fly conferencing and Visual V-Link – a web interface to the subscribers messages and services. All the logic necessary to orchestrate and deliver V-Link services is resident on a Pentium server attached to the network through a high speed Ethernet connection.



## GATELINK – THE SERVICE LAYER INTERFACE

The command interface that gives V-Link and other applications access to underlying network functions is GateLink, a software library and API. GateLink is a collection of Windows DLLs that abstract basic network functions, allowing them to be initiated with simple commands. GateLink effectively shields applications and developers from underlying network complexity and greatly accelerates the pace of coding.

In order to have an application make a call, for instance, a programmer need only call the GLINK\_PlaceCall function. All intermediate procedures such as routing look-up, fault testing, class of service look-up, and protocol conversion are automatically completed by GateLink and the network, transparently to the application. In essence, GateLink allows all applications to speak fluent IMCP, giving them native access to all network functionality and resources.

API SETUP FUNCTIONS	CALL SETUP FUNCTIONS	EVENT NOTIFICATION	MEDIA HANDLING
Open	Place call	Fetch event	Play from file
Close	Alert		Record to file
Start	Connect		Play from buffer
Stop	Hang up		Record to buffer
Register error callback	Transfer call		Enable DTMF detection
Register event callback	Blind transfer call		Disable DTMF detection
Register audio callback	Link calls		Play DTMF digit
Get global state	Unlink calls		Play DTMF sequence
Timer hit	Send application message		Collect DTMF digits
	Create conference		Store FAX
	Add to conference		Forward FAX
	Get channel state		Call whisper

Available GateLink function calls – version 2.2

In addition to function calls for call setup and control, GateLink includes calls for application setup, event notification and media handling. These latter provide applications with access to most network media resources. The GateLink API is currently available in versions for Windows and several UNIX platforms.

## THE I-LINK NETWORK SIMULATOR

The second key component of the GateLink SDK is an offline network simulator. Running on a Windows PC with LAN connection to a machine running test application code, the network simulator generates PSTN traffic load to the application, simulates prompt responses with DTMF tones, and emulates all functions of the I-Link network. Using the simulator, developers can subject an application to intense call loads and quickly and inexpensively isolate and resolve problems in their code, with no need for external testing or simulation tools.

The complete GateLink SDK including API, network simulator and developers notes is available for free download from the I-Link web site at [www.i-link.com](http://www.i-link.com).

## FAST FORWARDING THE PACE OF DEVELOPMENT

Working with GateLink, developers can concentrate on application logic, safely and conveniently insulated from all responsibility for underlying hardware, operating systems and control protocols. They can then subject their code to real life operating conditions using the network simulator, turning up the loads until every weakness is exposed. The combination of simplified coding and offline testing slashes development schedules and budgets to the bone.

Consider the case of Talk Free, a promotional application developed by I-Link programmers on an extremely tight schedule. Talk Free allows web site visitors to make trial long distance calls over the I-Link real-time network, using the same phone line carrying their dial up web access. Launched from the users web browser, Talk Free provides HTML prompts for caller and called party numbers and relays that data to SoftSwitch for call set up and control. The application then pauses the users web session, allowing the network to utilize the dial up connection for a telephone conversation. Talk Free monitors the call duration and terminates the connection unless the user requests additional time with a mouse click.

In essence, Talk Free takes instructions generated by a Web application and in response, creates and manages telephony sessions over a separate network. To develop a similar service in a conventional telephony environment would have required building not only the application logic required to bridge the two networks, but the telephony infrastructure necessary to setup and manage call sessions over the public switched circuit telephone system. The developers would have had to buy or build a computerized switching platform, program it to correctly manage call connection and control, routing, protocol management and failover response. They would have had to estimate the anticipated level of traffic and provide adequate bandwidth between the switch and carrier central office, typically in the form of leased T1 or DS3 lines, each of which would have to be connected to interface cards in the switching platform and tested. Finally, their application logic would have to be written to the switch's host CPU operating system and tested for proper interoperation with all lower level systems. Depending on the size of the switch needed to support projected traffic loads, upfront capital requirements might easily have reached the \$500 thousand to \$1 million range, with time requirements for platform engineering, software development, testing and debugging in the realm of 6 to 8 months.

Using the GateLink API and network simulator, I-Link developers completed a working prototype of Talk Free in just over two weeks, and delivered a commercial release in less than a month. Because all underlying infrastructure for call connection and control were available in the network itself, and accessible through the GateLink API, programming hours were reduced by nearly 90 percent and Talk Free development was completed with virtually no upfront capital outlay.

## THROTTLING THE COSTS OF DEPLOYMENT

In fact, the advantages of developing new services with the GateLink API can't be clearly appreciated without also considering the benefits of deploying them on the I-Link network. Applications can be centrally hosted at an I-Link network hub, or can access the network remotely over any high-speed data connection, including the Internet. Hosting charges are structured to lower the capital entry barrier, including a modest monthly flat fee and a transaction charge that rises with traffic and applica-

tion revenues. Services deployed on the I-Link network don't incur substantial hosting costs until the revenue stream to support them develops. Experimentation and quick response to moving market opportunities are suddenly made easy and affordable.

## **THE FUTURE OF GATELINK**

Additional features and functions are already in development for future releases of GateLink, including calls for text-to-speech and automatic voice recognition services. Call classes are also planned that will encapsulate various end device functionalities, providing streamlined development for services aimed at specific types of connecting devices – intelligent IP phones, for instance. Future releases of GateLink will also support the new VXML standard through a VXML voice browser built on GateLink.

## **THE FUTURE OF VoIP**

Together, the I-Link real-time IP network and the GateLink API bring enhanced communication services over IP out of the realm of blue sky and into easy, immediate reach of service providers, marketers and independent developers. Now, sophisticated services that fully exploit the possibilities of IP telecommunications can be easily developed and inexpensively deployed with a fraction of the capital commitment previously required. For more information and a free GateLink download, visit I-Link Incorporated on the web at [www.i-link.net](http://www.i-link.net).