



BUBBLELINK[®]
SOFTWARE ARCHITECTURE


scidyn[™]
The Voice of IP Telephony[™]



IP Telephony – BubbleLINK®

Overview

Digitized voice is sharing bandwidth with data. Packet-based networks are replacing circuit switch-based networks. Geographically distributed gateways are being managed and upgraded from a single location.

Internet protocol (IP) telephony is changing the face of telecommunications. Moreover, it is creating new opportunities for doing business in this dynamic marketplace. Spurred by global deregulation and an increasing demand for value-added services, new operators are eagerly exploiting the flexibility, low cost, and technological potential of the IP network. So how do you stay a step ahead?

BubbleLINK Takes You There - Faster

Moving a call from point A to point B is no longer the name of the game. Succeeding in the IP arena depends on your ability to rapidly deploy voice and data services while growing and managing your IP network.

SciDyn's Integrator family of Voice over IP (VoIP) products are based on a unique BubbleLINK® software architecture which allows multiple and varied applications to be quickly and effectively designed and deployed with Bellcore-level reliability.

The BubbleLINK architecture allows you to create and centrally manage a complete feature-rich IP telephony network that can accommodate virtually any application you like. Several powerful capabilities make this possible:

- **Dynamic deployment of new applications** - The inherent nature of BubbleLINK architecture lets you deploy any service or application more quickly than other operators or traditional telecoms.
- **Inter-chassis communications** - Each gateway in the system can communicate and share the load with other gateways, increasing network reliability, improving redundancy, and enhancing flexibility.
- **Single node addressing** - No matter how many gateways you add to a node, BubbleLINK can present a single address to the network for signaling interface regardless of how many ports are available for that node. This way you can quickly and easily grow your network without reprogramming every node.
- **Remote upgradeability** - The ability to upgrade from a centralized remote site gives you the flexibility to add new applications, upgrade software, and offer new features at significantly reduced installation costs.
- **Seamless scalability** - The inherently scalable architecture of BubbleLINK means that your network can be expanded to accommodate future growth. Size is no limit.

Time-Tested Foundation

The core technologies in the BubbleLINK architecture are not only state of the art, but are also very stable and time-tested. Core elements of this software architecture have been distributed by several telecom vendors within the United States and worldwide since 1996. One of the key attributes of the BubbleLINK architecture is its ability to apply leading edge technology changes quickly with minimal product impact.

SciDyn's IntegratorC-2000® series gateways, which are built on the BubbleLINK architecture, are better suited to provide various service offerings and support the dynamic changes of the industry today. Many competitors have a working gateway, but they have a long way to go before they are able to deliver the variety of applications required in a single chassis without the need to install new software for each application change.

Features

Residing on each gateway within your network, BubbleLINK software modules enable you to simplify network management while offering the value-added call features that will set you apart from your competitors.

BubbleLINK modules are programs (.exe files) and various control files that determine Integrator communications and operations. The modules can be resident on either the database server, the chassis, or both. The flexibility of this design allows modules to be placed where they can be most effective; offsetting high-performance modules so that processing load is equalized.

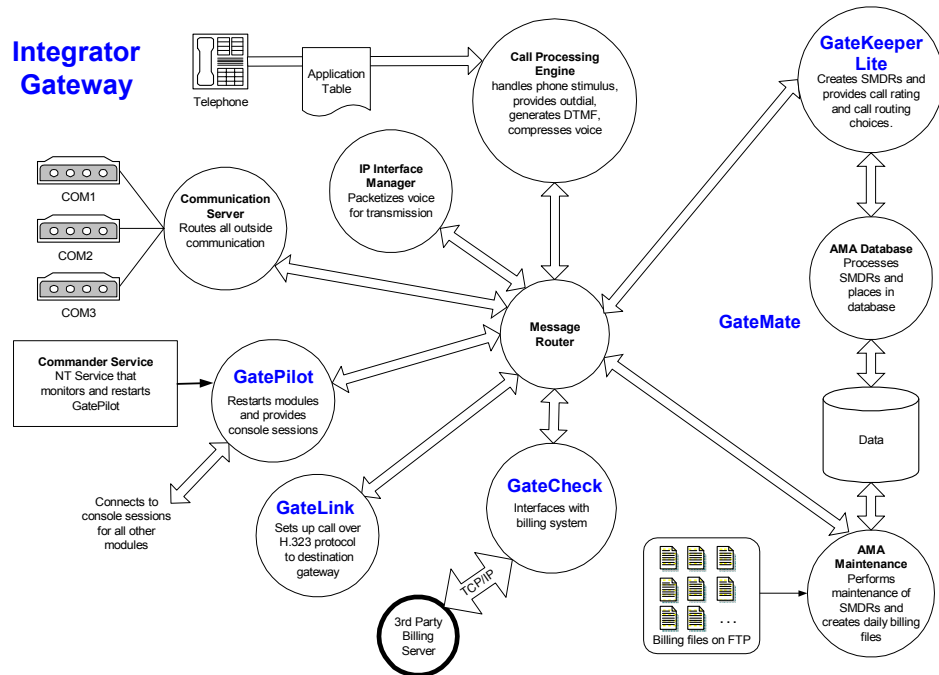
BubbleLINK Network Management Modules

- **GateKeeper Lite™** - Provides remote or distributed gatekeeper functionality for call billing, routing, and rating.
- **GateReport RT** - Provides real-time call analysis reports and graphs from live network activity.
- **GateReport** - Generates call analysis reports based on historical data stored by GateMate such as busy call hours, completed calls and call distribution.
- **GateLink** - Supports standard protocols, including H.323, SIP, and MGCP to provide selective interoperability between gateways.
- **GateCheck** - Interfaces in real time with third party billing systems, allowing credit verification, call rating and user validation.
- **GateMate** - Works with GateKeeper Lite to maintain call record history and generates station message detail record (SMDR) files to interface with third party billing systems.
- **GatePilot** - An interactive monitoring system that provides remote access to system maintenance functions and status.

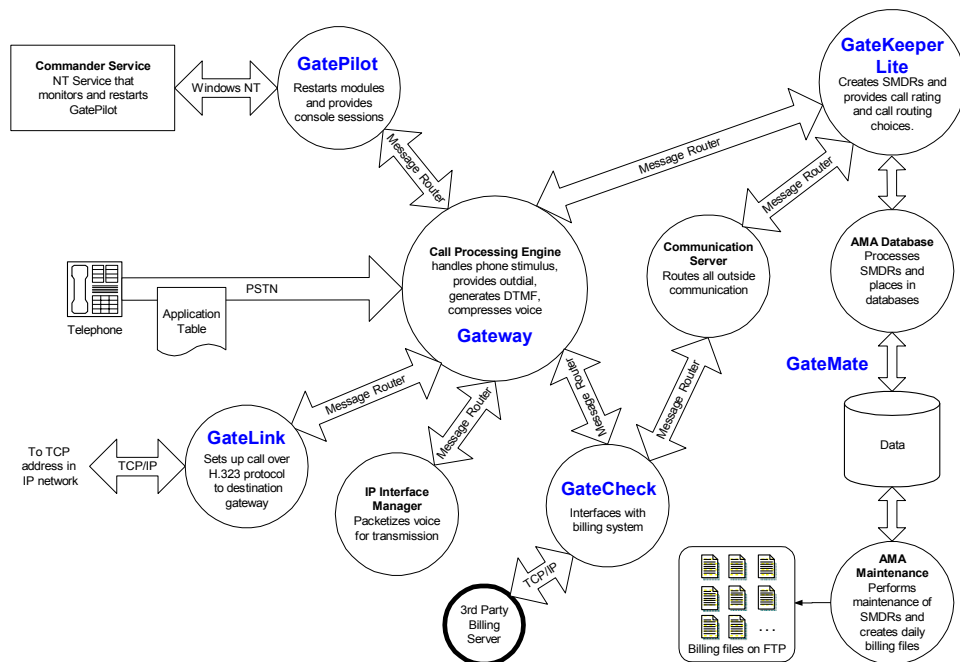
BubbleLINK Call Feature Modules

- **NetTalk** - Offers multi-language, interactive voice response capabilities.
- **NetTranslator** - Provides speech recognition and text-to-speech capabilities.

The following figure illustrates the BubbleLINK architecture for a typical VoIP network. Each module supports a single console session through the GatePilot module.



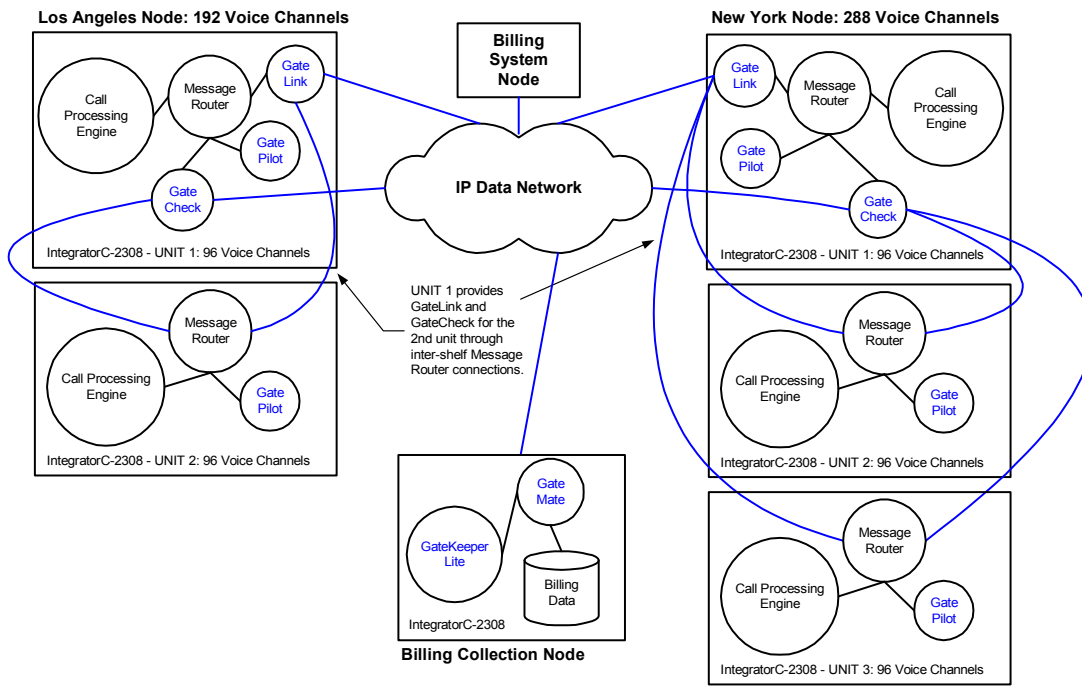
The figure below illustrates the logical organization of the BubbleLINK modules. As shown, the Call Processing Engine is central to the call process and orchestrates how all calls are handled. A number of modules connect to destinations outside of the immediate gateway system; either to another gateway in the Internet telephony network or to an entity in another network.



How Bubbles Work in Applications

BubbleLINK modules can all be run on the same computer or they can be strategically distributed between a number of units at a site or even between physical sites. The Message Router module becomes the glue that holds the rest of the modules together.

The figure below illustrates a VoIP network using IntegratorC-2308® gateways.



Module Descriptions

Call Processing Engine

The call processing engine, or telephony processor, is the central module in the BubbleLINK software architecture. In the VoIP application, it interfaces with the public switched telephone network (PSTN) interface hardware and provides call handling (answer, voice prompts, etc.) according to the events defined in the application table.

The application table, which also indicates the types of operations supported by the VoIP network, tells the call processing engine what type of external validation is needed to process the call. For example, caller validation (PIN) and address translation requests are passed on to other databases.

By moving some call functionality into various modules (bubbles), the SciDyn call processing engine is quicker to respond. The call processing engine does not have to know where the various server processes are – the message router module finds the server processes using namepipe addresses. This architecture provides a great deal of flexibility while maintaining a standardized interface.

Configuration of the BubbleLINK software modules and initial provisioning can be done through a standard Windows GUI or through a console interface.

Commander Service

At the root, of the BubbleLINK architecture is the commander service. This is a Windows NT® service that is responsible for starting and monitoring GatePilot. If GatePilot fails or is stopped, the commander service tries to restart it. GatePilot is responsible for starting and monitoring all of the other BubbleLINK modules. commander service is the only link into the Windows NT operating system, all other SciDyn software communicates through the message router module.

GatePilot

[GatePilot](#) provides network terminal functionality. GatePilot performs the following three functions:

- Starts and monitors the BubbleLINK software modules. If any module in its jurisdiction fails (crashes), GatePilot attempts to restart it.
- Provides remote access to the system through a modem, console port, or Telnet connection, from which you can use DOS commands to access directories and files.
- Provides a connection to console sessions with BubbleLINK modules.

Message Router

Message router is the backbone of the BubbleLINK message system. It provides the standard and reliable communication paths between the BubbleLINK software modules and between Integrator gateway units. Message router has been field-proven in the Commander inmate phone control product for nearly 5 years.

A message router module resides anywhere that modules need to communicate to each other.

Communication Server

Communication server controls all system communication (COM) ports and provides common file transfer capability. Typically, a system has a COM port dedicated to dial-in maintenance. Communication server works with a site manager database and a modem configuration file.

This module spares other modules from the task of COM port and modem administration. As a network or node server, communication server allows a COM port from one unit to be accessed and used by any other unit in the network.

IP Interface Manager

IP Interface manager interfaces with the IP Interface hardware. It controls the packetization of voice data. The voice information must be compressed and broken down into packets for transmission across the Internet telephony network. Controls are set in the configuration file.

GateLink

[GateLink](#) provides H.323 protocol server functionality by providing translation between internal message formats and IP formats. This entails negotiating the IP address and vocoder used for the call and then tearing down the call processes when a party hangs up.

A typical call scenario may go like this: the call processing engine requests call setup for routing location (preferred gateway) and passes along the initiating TCP port for the call. If the preferred gateway can accept the call, the far-end call processing engine sends back an acknowledgement with its receiving UDP port ID through the far-end GateLink module. Once connected, the PSTN Interface and IP Interface boards proceed with packetizing and transferring voice packets across the Internet.

If the preferred gateway is not available or cannot handle the call, the call processing engine provides another routing location – GateKeeper Lite provides the call processing engine with up to three routing choices based on the call rating information.

A future SIP protocol server will provide additional IP format translations. As a new BubbleLINK module, the SIP protocol server can be added to the system without changing the system's core engines and servers.

GateKeeper Lite

[GateKeeper Lite™](#) provides the following gatekeeper functionality.

- Rating calls before they are connected
- Supplying address translation
- Costing calls when they terminate
- Creating call detail records and writing them to a database

The call processing engine module makes requests for call rating and address translation information. GateKeeper Lite takes the telephone number called and translates it into an appropriate IP address. GateKeeper Lite returns up to three destination gateway addresses. If the first IP gateway is unavailable or busy, the call is placed to the second choice. If that is unavailable, the third choice is used.

When the call completes, GateKeeper Lite writes the call detail records into a database.

GateMate

The [GateMate](#) module provides record keeping and database maintenance functionality. GateMate processes the station message detail records (SMDR) and verifies database integrity. On a daily basis, GateMate maintains the SMDR database by

- Pruning and packing the SMDR database to enforce size and aging requirements
- Generating billing files in AMA format

Billing files are then available through an FTP connection. GateMate tracks the status of the billing files being collected by 3rd party billing systems. If desired, you can use GateMate to generate call analysis reports from a console session.

The GateMate module consists of two processes:

- AMA Database
- AMA Maintenance

GateCheck

GateCheck provides [GateCheck](#) functionality through its real-time validation interface to a 3rd party billing or calling card system. GateCheck essentially provides translation of local message formats (Message Router) to the non-SciDyn system format.

Currently, GateCheck interfaces with the MindCTI iPhonEx Real-Time Billing Server and Radius AAA Systems.

Speech Server

Speech Server provides [NetTalk](#) and [NetTranslator](#) functionality. Actually, the Call Processing Engine's use of voice prompts and resident speech sets also provide [NetTalk](#) functions, which is to offer multi-language, interactive voice response capabilities. [NetTranslator](#) provides speech recognition and text-to-speech capabilities.

The Speech Server has the following functionality:

- Speech Recognition – Provides automatic speech recognition (ASR) by identifying the word spoken. For example, identifying that the speaker said "Yes."
- Speaker Verification – Provides confirmation of the person speaking. For example, this process can verify that the valid user, John, is the person speaking. This technology works from sampled voice patterns and not just word patterns.
- Text-to-Speech – Provides translation of typed text into spoken speech. An application of this technology would be to voice emails over the phone when requested.

Summary

SciDyn's BubbleLINK software architecture is a dynamic and flexible foundation for multiple and various applications. Using BubbleLINK, SciDyn has successfully deployed 20,000 ports of service over the last 5 years. Service has been provided by Bell Operating Companies, Regional Bell Operating Companies (RBOCs), and independent Telephone Companies (Telecos) in a variety of applications including inmate phone control systems, automated collect call services, and voice over IP network gateways.

For more information about BubbleLINK or Integrator applications, contact SciDyn.

About SciDyn

Founded in 1973, Science Dynamics Coporation (SciDyn) develops, designs, and sells telecommunications systems for the emerging IP telephony market. Our vision is to deliver innovative software and hardware solutions that facilitate the transition from circuit switched transmission to a digital packet-based communications environment. SciDyn is headquartered in Cherry Hill, New Jersey and has an international sales office in the United Kingdom.

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