Introduction

The Cisco Systems Virtual Central Office (VCO) series offers an integrated hardware and software solution that delivers the power and flexibility of a fully open telecommunications system. This includes enhanced services such as voice/fax messaging, operator services, and voice dialing, as well as technologies, such as ISDN and the Advanced Intelligent Network.

System Architecture

The system architecture of the VCO/4K incorporates four discrete elements:

Multi-Level Call Control—The VCO/4K gives you real-time control and the ability to tailor call treatments. The system is open at many levels—switching, service circuits, and network interfaces. Its host control and programmability make it easy to integrate computer and telecommunications environments.

Switching—The VCO/4K features a robust, nonblocking, switching matrix and a distributed network subsystem designed with industry-standard hardware and software. It allows economical, modular growth of ports. This switching function minimizes the requirements for costly external resources (such as speech recognition) by connecting to them only when needed instead of tying them up for the entire call.

Variety of Network Interfaces—A wide variety of interfaces includes standard analog and digital interfaces for public networks, such as E&M, T1, ISDN, Primary Rate Interface (PRI), and E1. The VCO/4K can interface with virtually any network environment, providing a bridge between mature and evolving technologies.

Internal Service Circuits—VCO/4K service circuits provide the features and flexibility you need for application-specific call handling, such as tone detection and generation, call progress analysis, conferencing, and voice prompting. The basic philosophy behind every VCO/4K is to provide a total application solution for advanced telecommunications systems. This philosophy incorporates the VCO/4K open architecture, modular growth, standards compliance, reliability, and fault tolerance. Each of these elements is discussed further in the following sections.

Open Architecture

The VCO/4K offers basic switching functions and multilevel call control for a wide range of network interface and internal service circuits.

Instead of being locked into a standard call treatment, VCO/4K open architecture call control allows you to design custom call scenarios. You can define new call treatments to match changing market demands.

A communications link allows the VCO/4K to inform a host computer about events detected on network interfaces and any processing already performed. The host, in turn, provides call control instructions to the VCO/4K. Optional TeleRouter software provides autonomous call routing functions on the VCO/4K without host intervention.

Because of its open architecture, the VCO/4K can operate with a wide variety of host computers, from PCs to mainframes. You can choose a host computer and operating system to suit the application, not the switch. This open architecture design also supports multihost, multiswitch environments.

VCO/4K network interfaces also support connection to a variety of telecommunications equipment, such as voice storage and retrieval units, facsimile devices, and telephone sets. Applications are not constrained by proprietary equipment.

Modular Growth

Modular design, in both hardware and software, makes the VCO/4K a platform for growth. You can add greater call handling capacity and new features without making existing equipment or software obsolete. The VCO/4K also gives you a technical growth path. Its basic system architecture supports incorporating new technologies so that your services can evolve as the network evolves.

All VCO/4Ks use the same standard system software. Applications developed and tested on a smaller laboratory system can be easily deployed on larger systems. All control interfaces are identical on all VCO/4Ks.

Standards Compliance

The VCO/4K is designed and manufactured in compliance with exacting industry standards. For system hardware, this includes:

• Network Equipment–Building System (NEBS) criteria

• GR-63-CORE with Zone 4 Earthquake

• Bellcore's GR-1089-CORE Safety and Physical Protection

⚠ **Caution**   The front door must remain on during system operation and the PCB card retainer bars must remain intact to comply with these requirements.

If your system arrived with blank card assemblies (blank faceplate and blank metal blade) installed, these assemblies must also remain in their original locations, unless you replace them with a functional system card. These blank card assemblies are carefully configured to compartmentalize the system for safety reasons and are critical to maintain compliance.

• UL 1950 Standard for Information Technology Equipment

• Federal Communication Commission (FCC) Rules, Parts 15 and 68

• Canadian Standards Association Standard C22.2 No. 225-M90

- Europe:
    - EN 60950 Safety of ITE
    - EN 55022 Class A, 1994, EMI
    - EN 50082-1: 1992, EMC
- Japan:
    - IEC 950 Safety of ITE
    - VCCI, Class 1, EMI
- Australia and New Zealand: AS/NZS 3548: 1995, Class B, EMI

FCC Part 68 Specifications

This section describes the FCC Part 68 requirements. This text is provided to Cisco Systems, Inc. by Dash, Straus & Goodhue, Inc. as an exact copy of the information required by the FCC.

1. The Federal Communications Commission (FCC) has established Rules which permit this system to be directly connected to the telephone network. Standardized jacks are used for these connections. This equipment should not be used on party lines or coin lines.

2. If this system is malfunctioning, it may also be causing harm to the telephone network. The system should be disconnected until the source of the problem is determined and until repair has been made. If this is not done, the telephone company may temporarily disconnect service.

3. The telephone company might make changes in its technical operations and procedures. If such changes affect compatibility or use of this system, the telephone company is required to give adequate notice of the changes. You will be advised of your right to file a complaint with the FCC.

4. Before connecting this system, you must inform the local telephone company of the following information:

Port ID	REN/SOC	FIC[1]	USOC[2]
T1	6.0P	N/A (XD Device)	N/A (XD Device)
4-Span T1	6.0P	N/A (XD Device)	N/A (XD Device)
ICC with 16-Span T1 I/O Module	N/A	04DU9-BN/1SN	6.0P

1. Facility Interface Code
2. Uniform Service Order Code

The ringer equivalence number (REN) is used to determine how many devices can be connected to your telephone line. In most areas, the sum of the RENs of all devices on any one line should not exceed five (5.0). If too many devices are attached, they may not ring properly.

5. Allowing this equipment to be operated in such a manner that prevents proper answer supervision is a violation of Part 68 of the FCC Rules.

   Proper answer supervision includes the following conditions:

   a. This equipment returns answer supervision to the PSTN when DID calls are:
   – Answered by the called station
   – Answered by the attendant
   – Routed to a recorded announcement that can be administered by the CPE user
   – Routed to a prompt

   b. This equipment returns answer supervision on all DID calls forwarded to the PSTN. Permissible exceptions are:
   – A call is unanswered.
   – A busy tone is received.
   – A reorder tone is received.

6. The software contained in the Model VCO/4K allows you access to the network must be upgraded to recognize newly established network area codes and exchanges codes as they are placed into service.

   Failure to upgrade the premises systems or peripheral equipment to recognize the new codes as they are established restricts the customer and the customer's employees from gaining access to the network and to these codes.

   Bell Communications Research (BELLCORE) publishes the North American Numbering Plan (NANP) information. An abbreviated summary of the newly established area codes and exchange codes is also available. You can contact Bellcore at (908) 699-6700 to obtain appropriate information to keep your equipment upgraded.

7. This equipment is capable of providing users access to interstate providers of operator services through the use of access codes.

   It is a violation of the Telephone Operator Consumers Act of 1990 for interstate providers to modify this equipment to block access dialing codes.

8. In the event of equipment malfunction, all repairs should be performed by our company or an authorized agent. It is the responsibility of users requiring service to report the need for service to our company or to one of our authorized agents.

Reliability and Fault Tolerance

VCO/4K design and technology provides reliability and fault tolerance that is critical to the success of emergency response and high revenue-generating applications. Features that contribute to reliability and fault tolerance are as follows:

- Full redundancy options for all major subsystems, including:
  – Control
  – Storage
  – Bus communications
  – Power supplies
  – Host links

- – Tone plan

- – System synchronization

- Alarm notification, consistent with Bellcore standards, such as:

  - – Messages to host, printer, and log file

  - – Visual indicators

  - – Relay contact closures for audible alarms

- Diagnostic, maintenance, and administration access to the system from a variety of locations:

  - – Local access via system console

  - – Remote access via modem or Telnet (with optional Ethernet Communications Package)

  - – Host command support for changing port status, configuring T1/PRI timing source, switching controllers (redundant systems), and other functions

- SNMP Network Management

- High mean time between failure (MTBF)

- Network interface and service circuit cards that can be changed while the system is up and running

- No host feature for handling calls on host failure