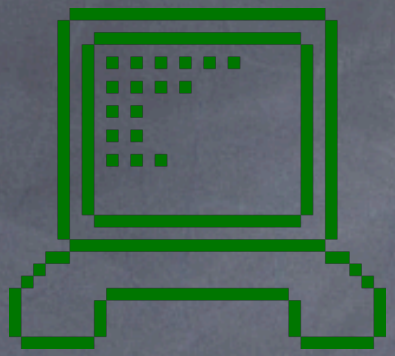
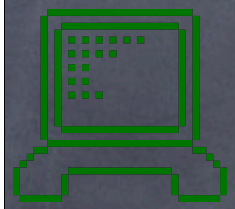


Collaboration Technologies for Mac OS X Server

Putting Voice on Your Macintosh Network

Michael Bayer
Computer Telephony Solutions

For more information contact: mbayer@CTExpert.com

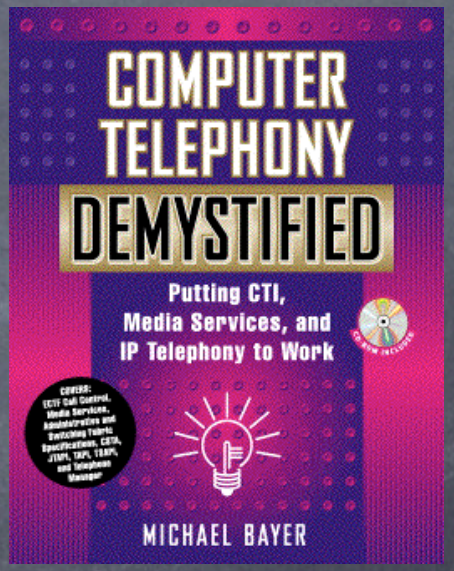


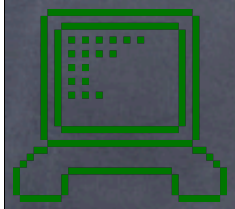
The Challenge:

- Select and deploy the
  - hardware
  - software
  - services
- that
  - allow your people to communicate
  - project the credibility and professionalism of your organization
  - are cost effective
  - provide a strategic advantage

Introductions

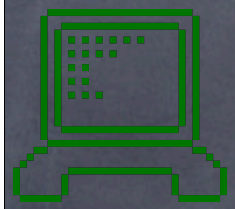
- Member of the original Macintosh Telephony Team
- Author of McGraw Hill's "Computer Telephony Demystified"
- Consulting Company:
  - Help users build Computer Telephony Solutions
  - Help developers build great products
  - Coaching and consulting
- Macintosh Telephony Alliance



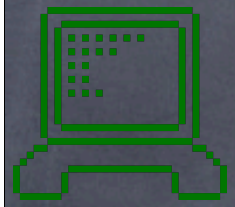


Session Overview

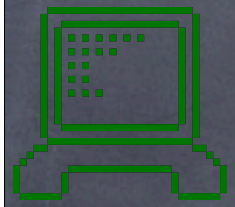
- Part 1: Key Concepts
  - What's driving VoIP?
  - What are the building blocks?
- Part 2: Technology
  - VoIP / CTI / Media Services
  - Asterisk and iChat
  - Other voice products and services
- Part 3: Roadmap for Deployment
  - Developing an implementation plan
  - Selecting products
- Part 4: Next Steps
  - Where do you go from here?



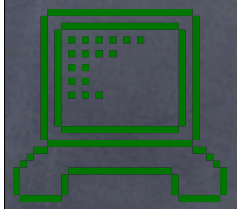
Demo:
Mac OS X Server as Voice Communication Hub



Key Concepts

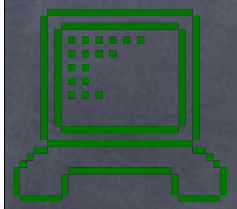


What is Driving VoIP?



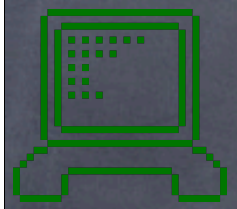
What is Driving VoIP?

1. Ideology
2. Revenge
3. Cost Savings
4. Desire for Customized Telephony



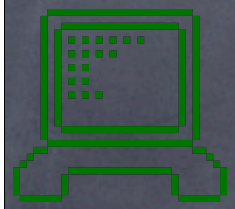
What is Driving VoIP?

1. Ideology - Engineers and Special Interests
2. Revenge - IT Staff
3. Cost Savings - Bean Counters
4. Desire for Customized Telephony - Business Decision Makers



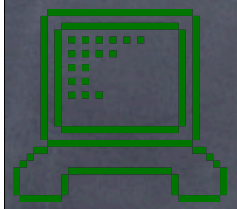
What is Driving VoIP?

1. Ideology
   - Dialtone comes from God-it should be free
   - Telephony should be free from government regulation, consumer protection, taxes, and wiretapping.
2. Revenge
3. Cost Savings
4. Desire for Customized Telephony



What is Driving VoIP?

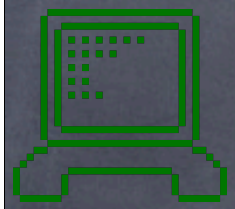
1. Ideology
2. Revenge
   - Everybody hates the phone company
   - IT vs Telecom Staff
3. Cost Savings
4. Desire for Customized Telephony



What is Driving VoIP?

1. Ideology
2. Revenge
3. Cost Savings
   - infrastructure simplification
   - toll bypass
   - lower cost carriers
4. Desire for Customized Telephony

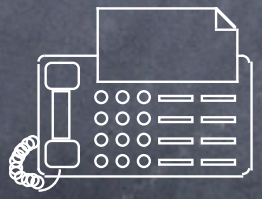
Enterprise Networking with Separate Voice



Customers /Clients

Partners

Vendors /Suppliers



Switched Telephone VPN

Private Switched Telephone Network

Public Switched Telephone Network

Wireless Telephone Network

Intranet

DMZ

WLAN

Data VPN

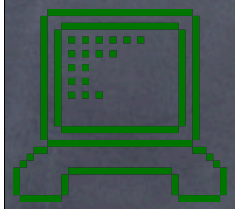
Internet

Extranet

Your Organization

Home-based Workers

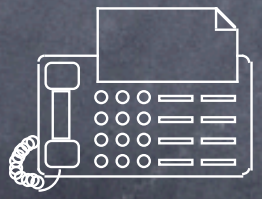
Enterprise Networking with Converged Voice



Customers /Clients

Partners

Vendors /Suppliers



Public Switched Telephone Network

Extranet

Internet

DMZ

Intranet

WLAN

Data VPN

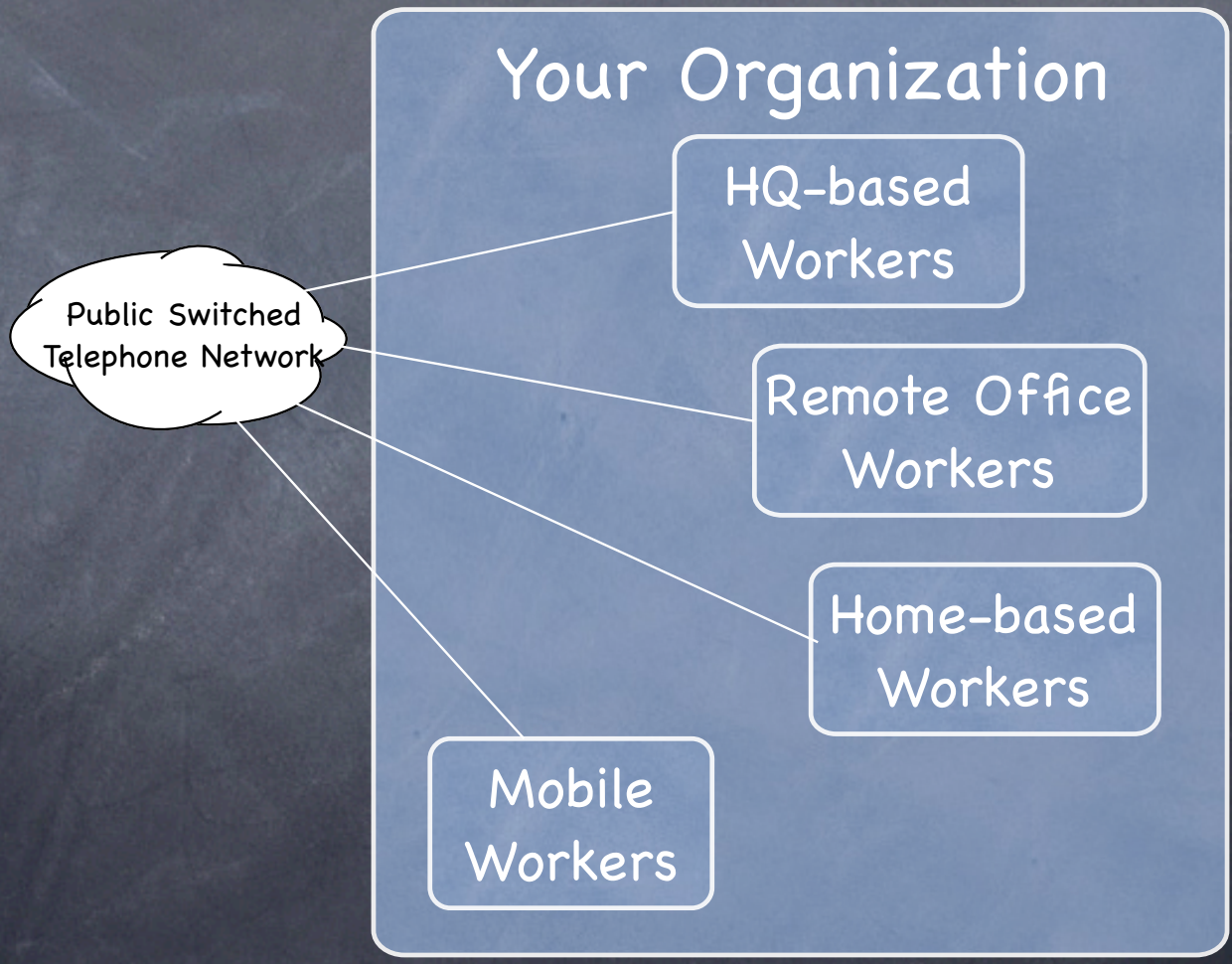
Your Organization

Office-based Workers

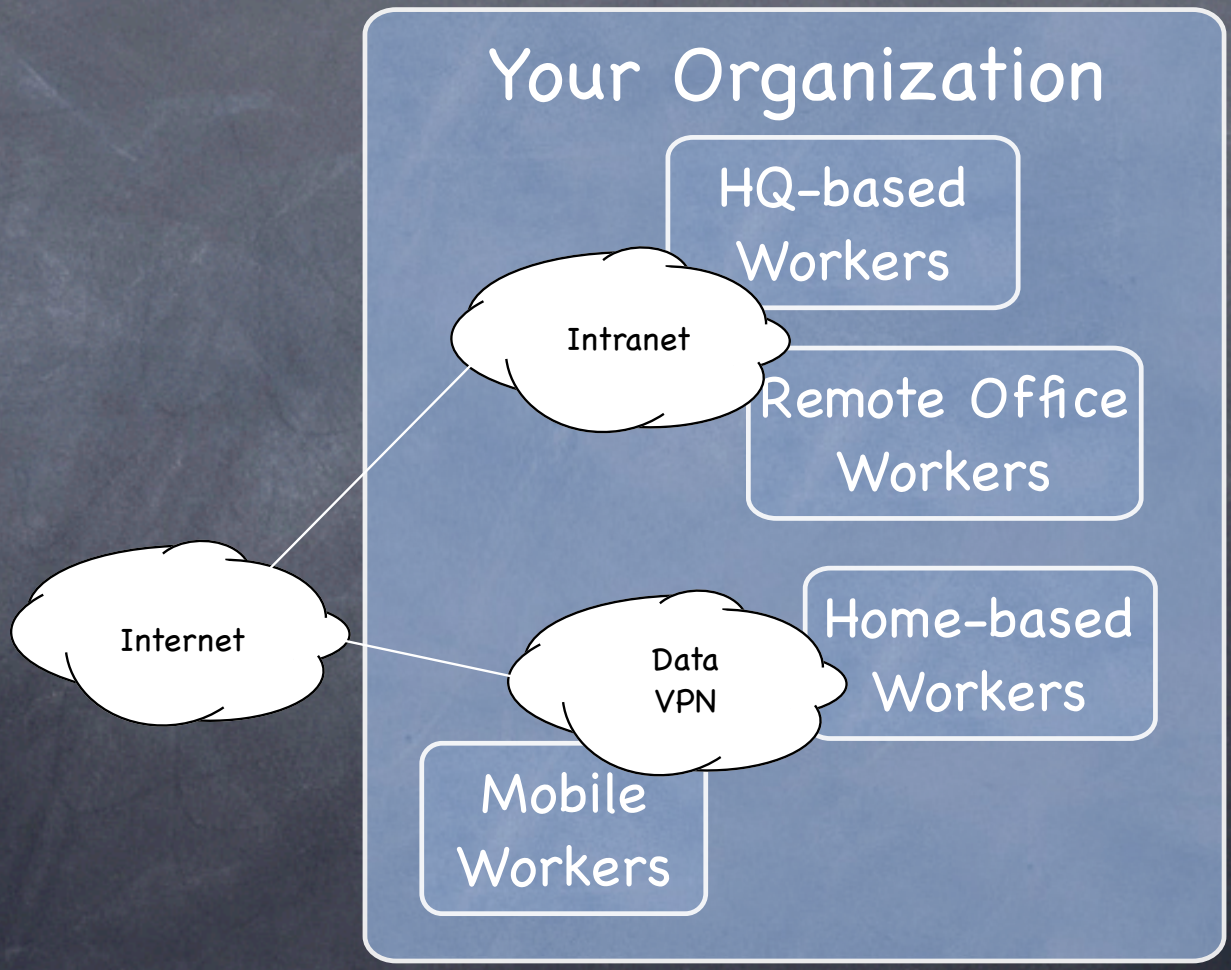
Mobile Workers

Home-based Workers

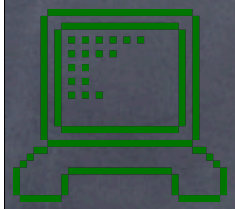
Coventional Wide Area Voice Networking

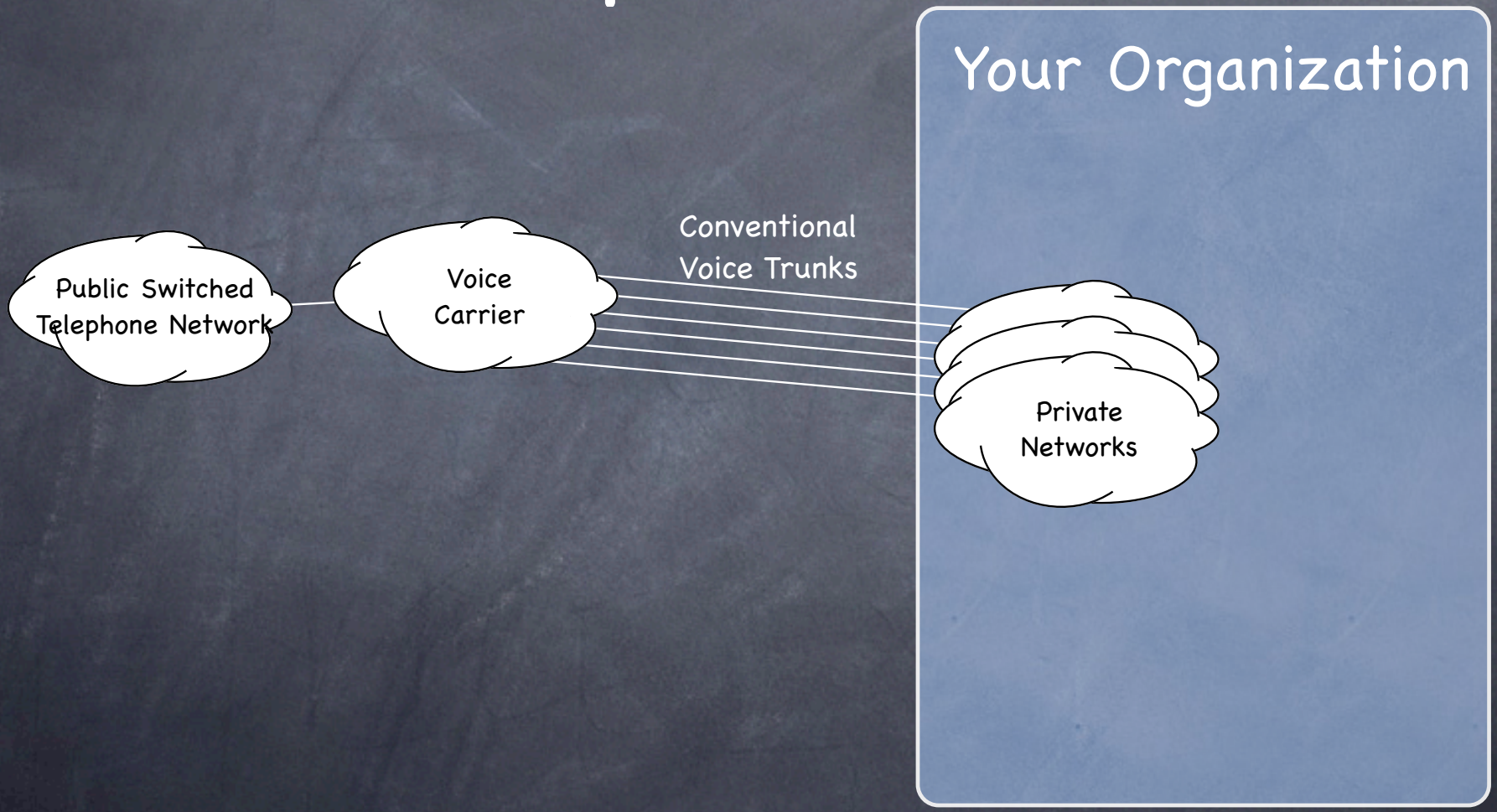


VoIP for Toll Bypass

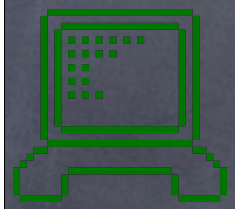


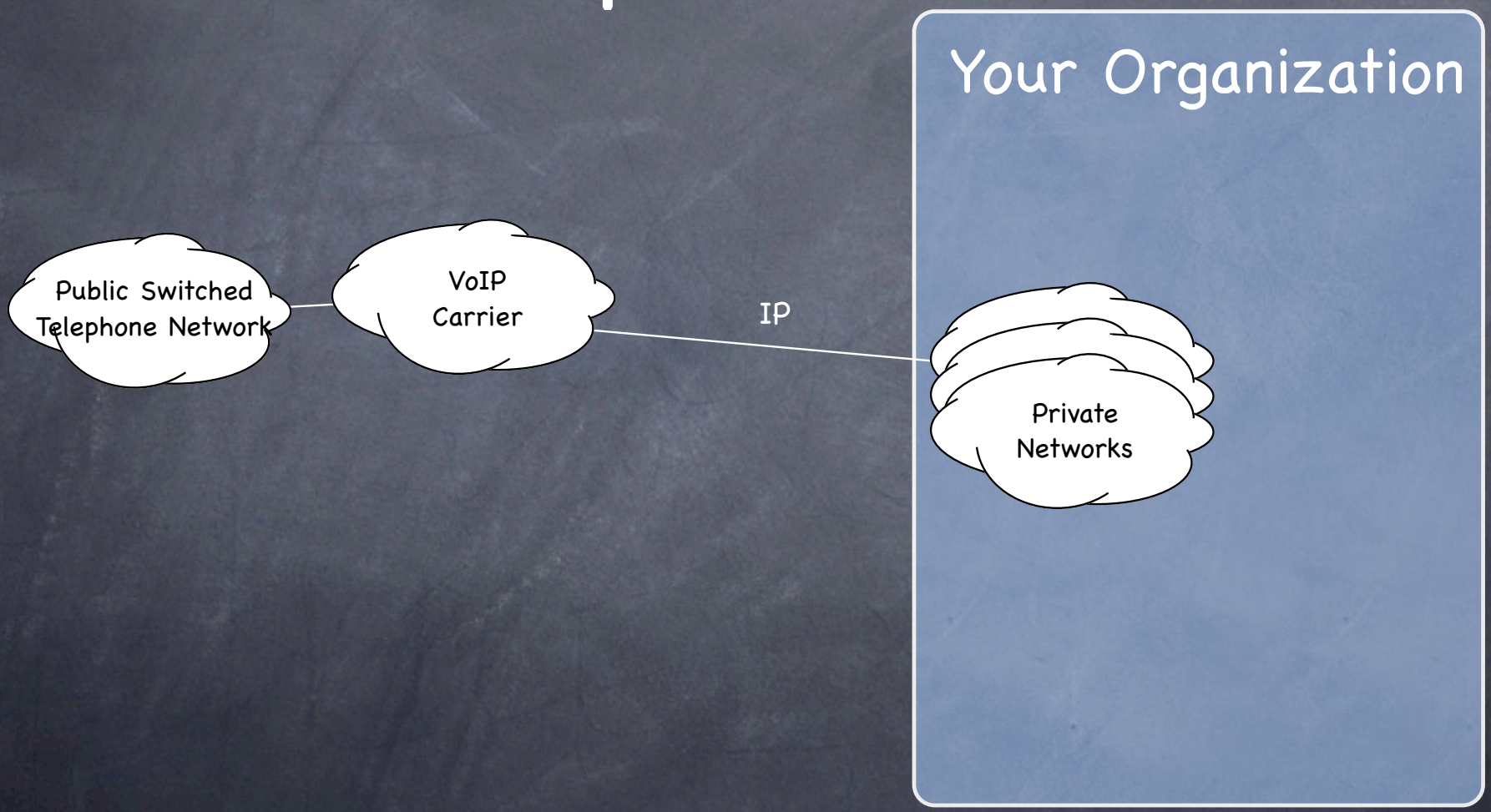
Conventional Telephone Service



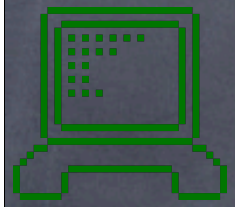


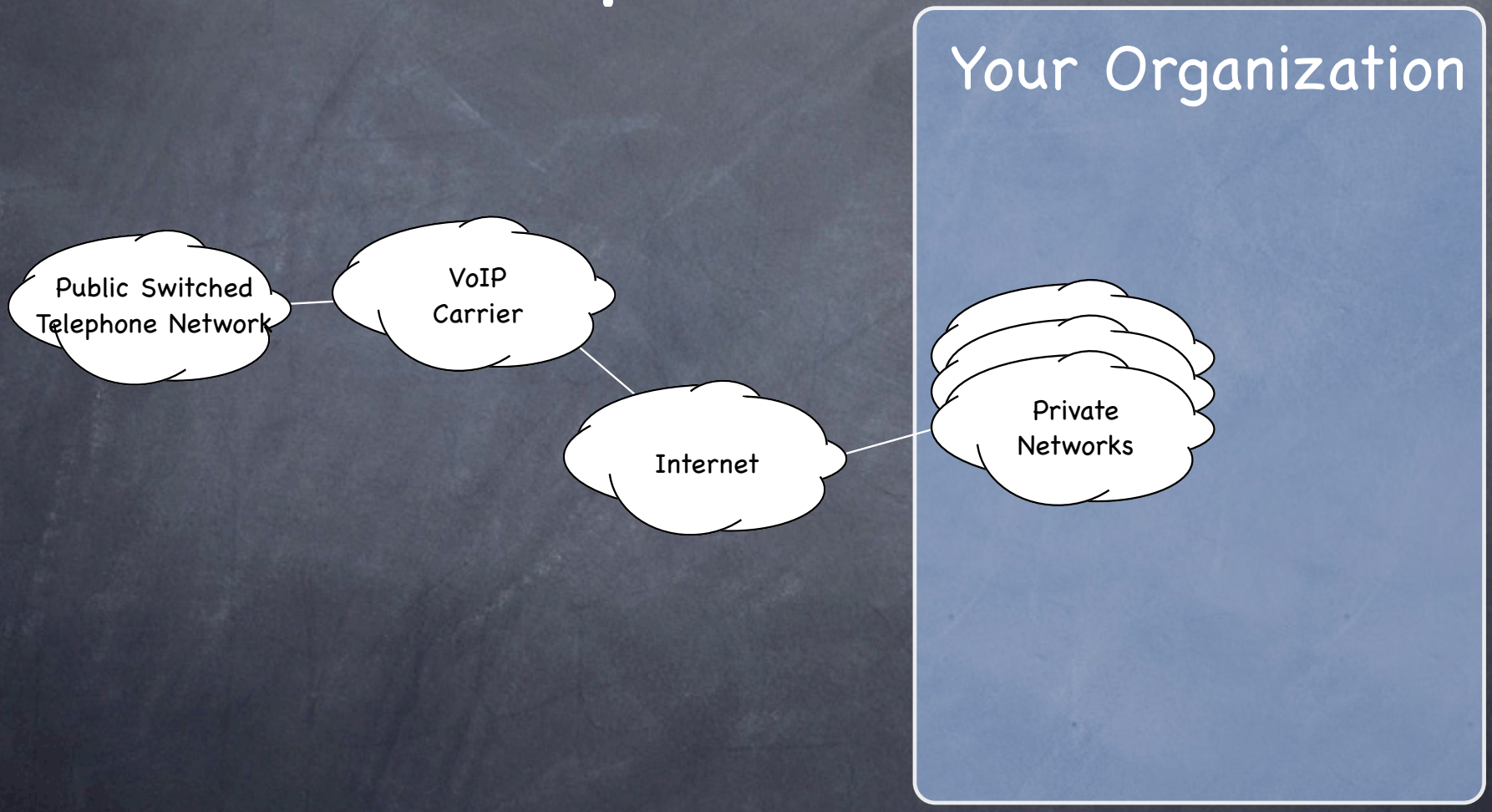
VoIP Telephone Service

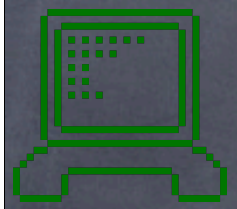




VoIP Telephone Service







What is Driving VoIP?

1. Ideology
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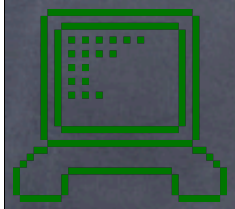
4. Desire for Customized Telephony

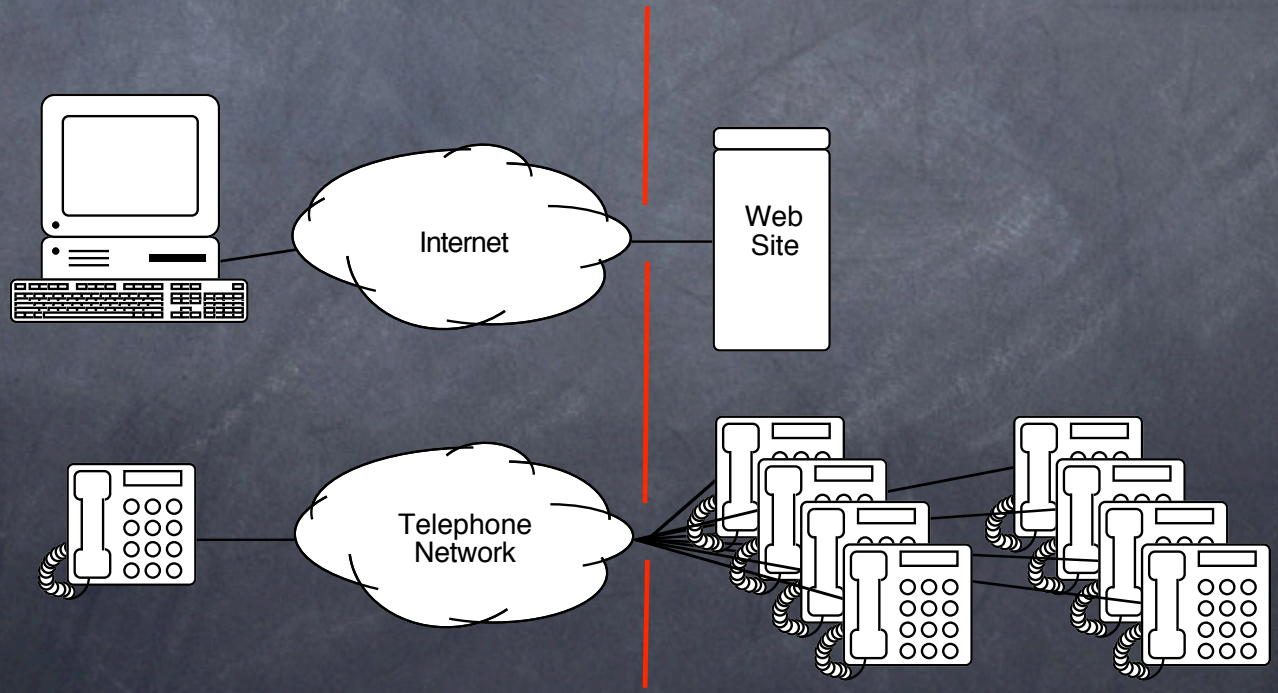


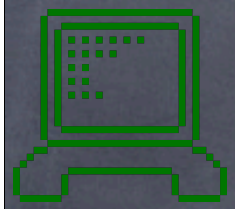
Customized Telephony

Telephone systems
that are
tailored
to the
unique needs
and
preferences
of
organizations and individuals

Organizational Context

- Organizations of all sizes are deploying CRM systems to integrate telephone and information systems





Customized Telephony

Customizing

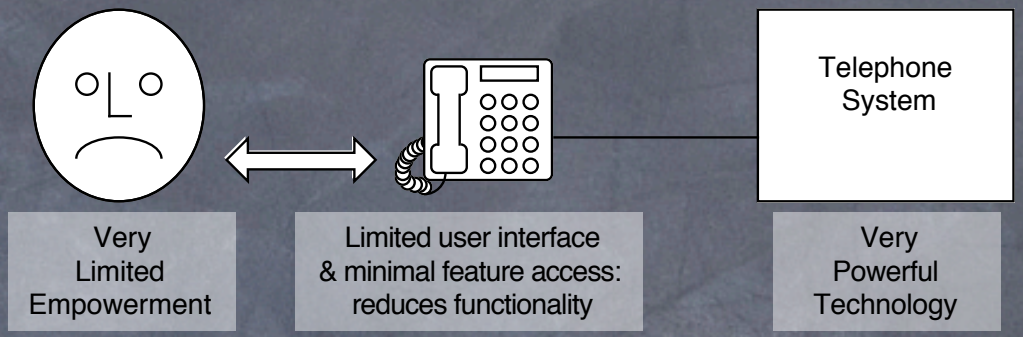
your

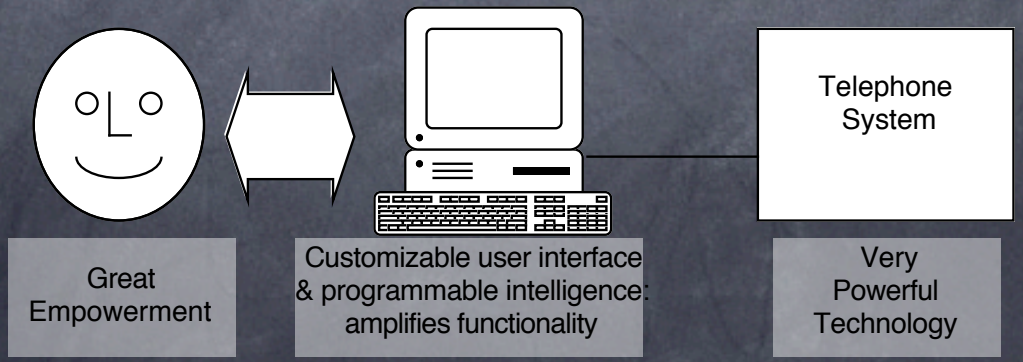
telephony experience

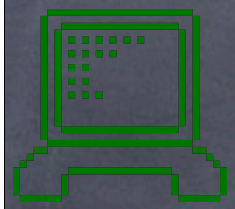
through

empowering technology

Customized Telephony







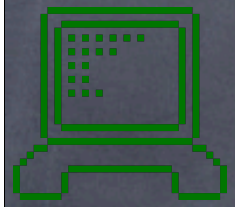
The Building Blocks

Customized Telephony Applications

APIs/Protocols for Customization

Telephony Infrastructure

The Hope of VoIP Buyers



Customized Telephony Applications

Proprietary and/or
Expensive and/or
Limited in Functionality

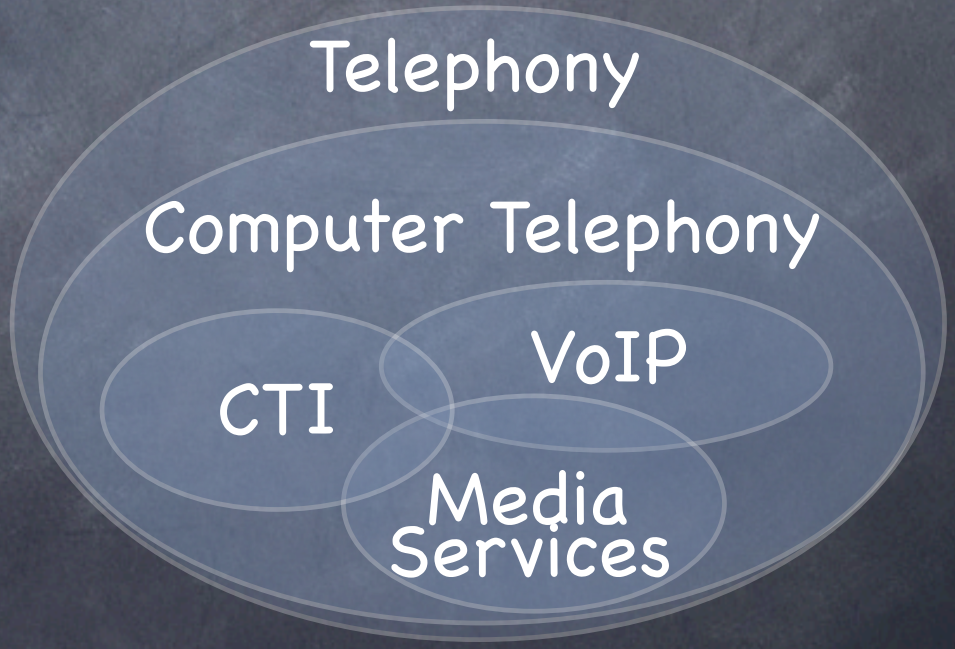
Conventional
Telephony Infrastructure

Open, Cheap,
Full Featured

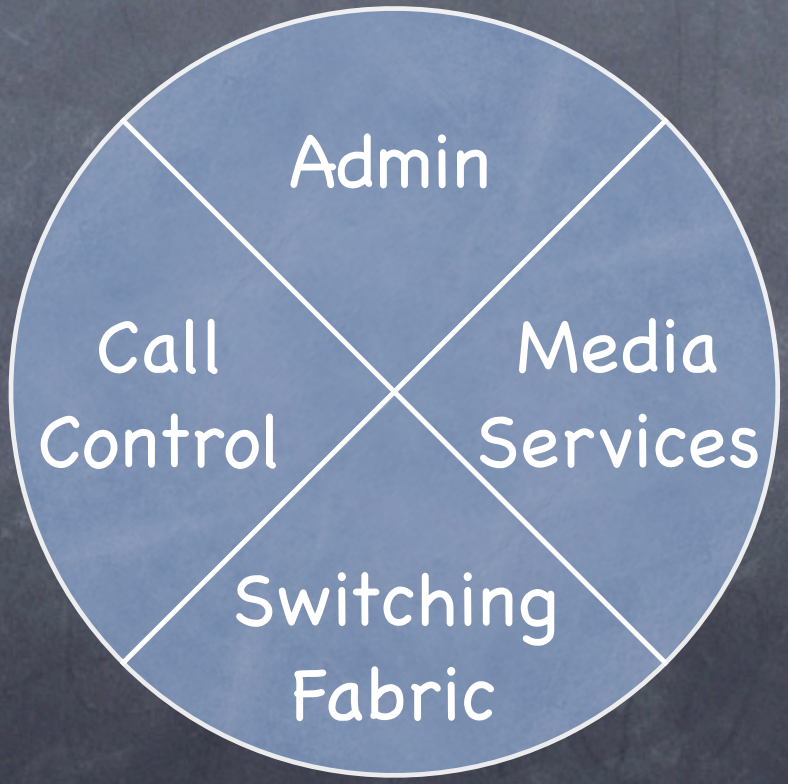
VoIP
Infrastructure

VoIP is Just Part of the Puzzle

- Telephony
- Computer Telephony
- Computer Telephony Integration (CTI)
- Media Services
- VoIP

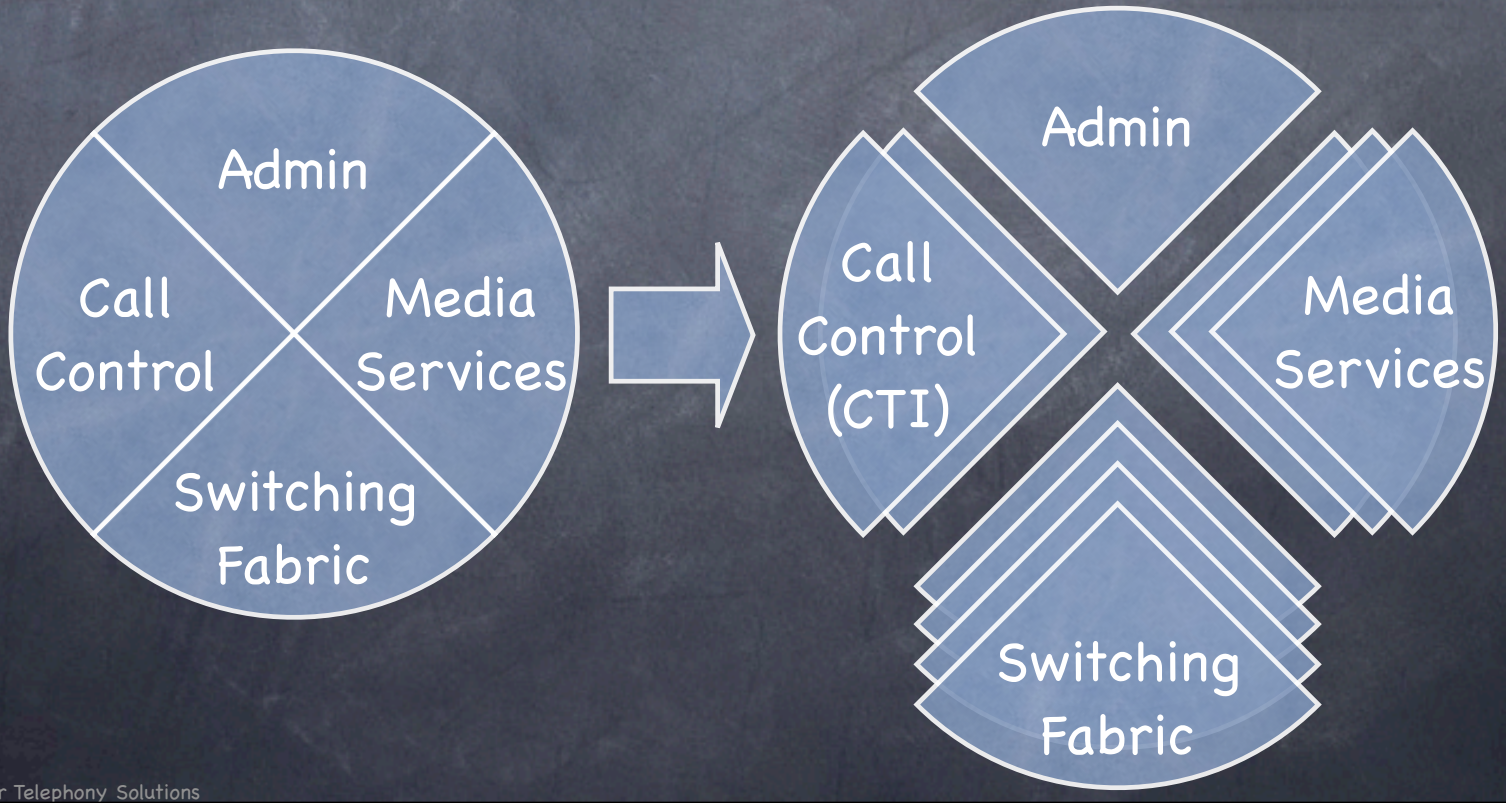


Telephone System Components



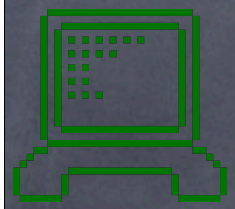
Computer Telephony Revolution

- Using off-the-shelf computer technologies to implement telephone system components
- Shift from Monolithic to Modular systems



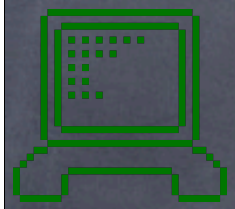
Switching Fabric

- Establishes media stream channels between endpoints and conveys signaling information
- Conventional Switching Fabric
  - TDM bus backplanes connecting line cards
  - Analog (POTS) and digital (T-1, ISDN, proprietary) telephony circuits
- VoIP Switching Fabric
  - Packetized voice over conventional IP networking infrastructure
  - Typically uses off-the-shelf technology



CTI Defined

- Call Control
  - Monitoring and directing calls in a telephone system
- Telephone Control
  - Monitoring and controlling features of a telephone set
- Media Binding
  - Linking other communications/telephony functionality to calls in a telephone system

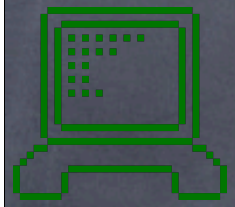


CT Media Access/Services

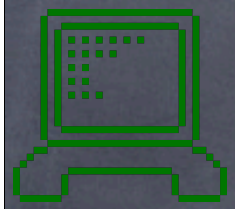
- Tone Detection and Generation
- Recording and Playback
- Text-to-Speech
- Speech Recognition
- Modulated Data (Modem/Fax)
- Digital Data (Compressed Video, etc.)
- Call Binding

Admin

- System configuration
  - System customization
  - Moves / Adds / Changes
- Fault monitoring
- Accounting
- Performance management
- Security



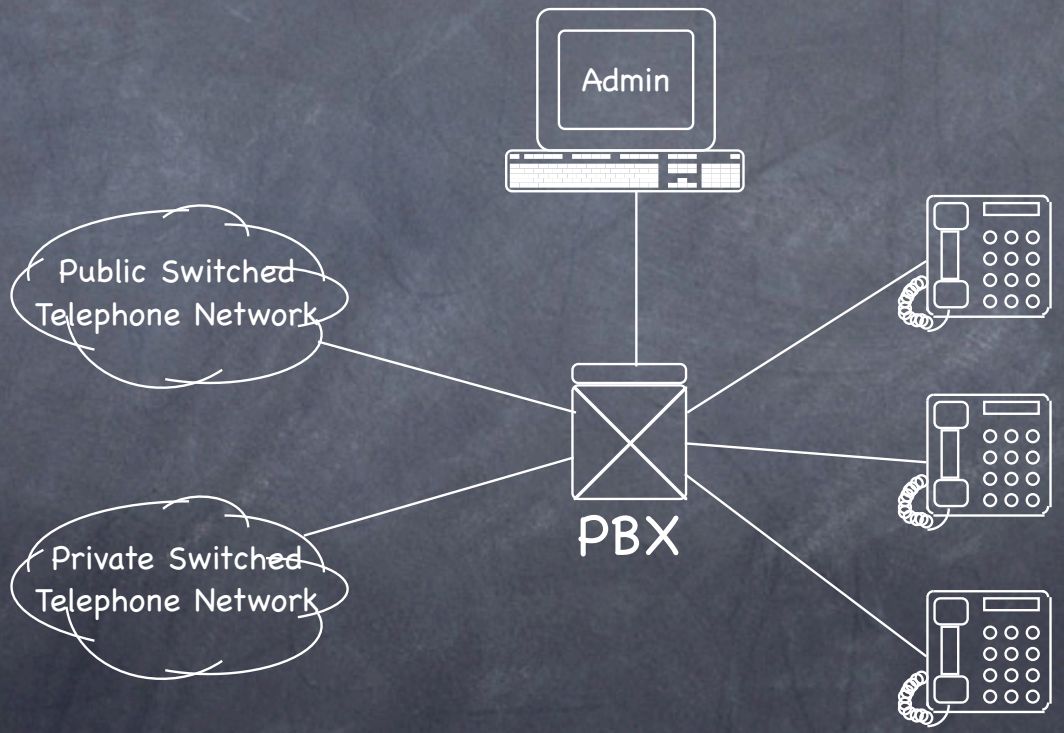
Technology



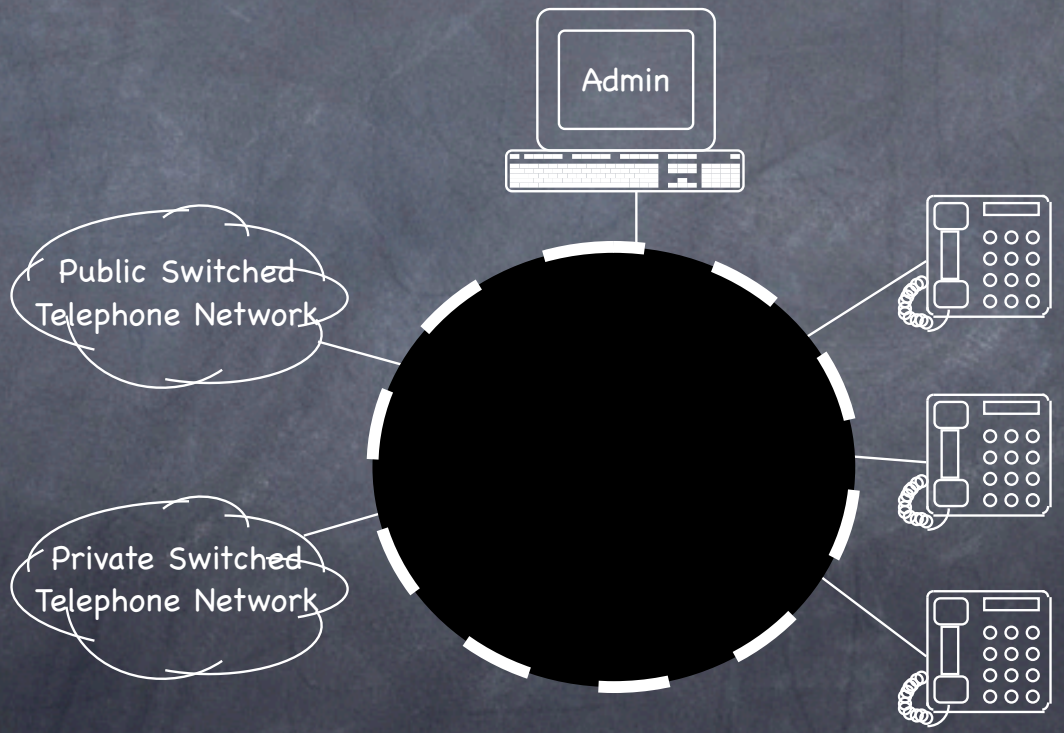
Technology

- Evolution of telephone systems
- CTI and Media Services
- VoIP Protocols
- Instant Messaging and Presence

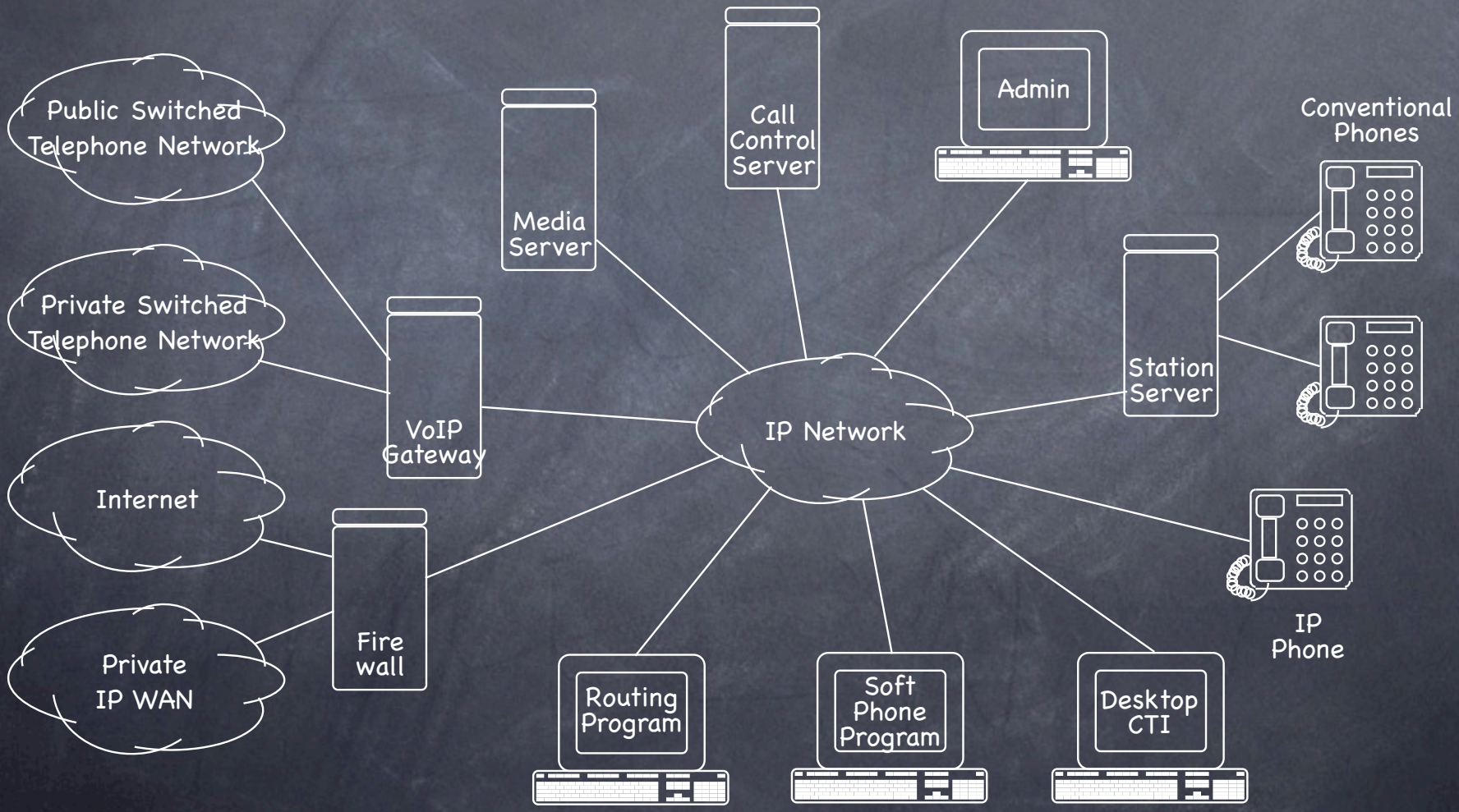
Conventional Telephone System: PBX



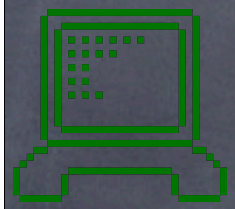
Eliminating the Monolithic PBX

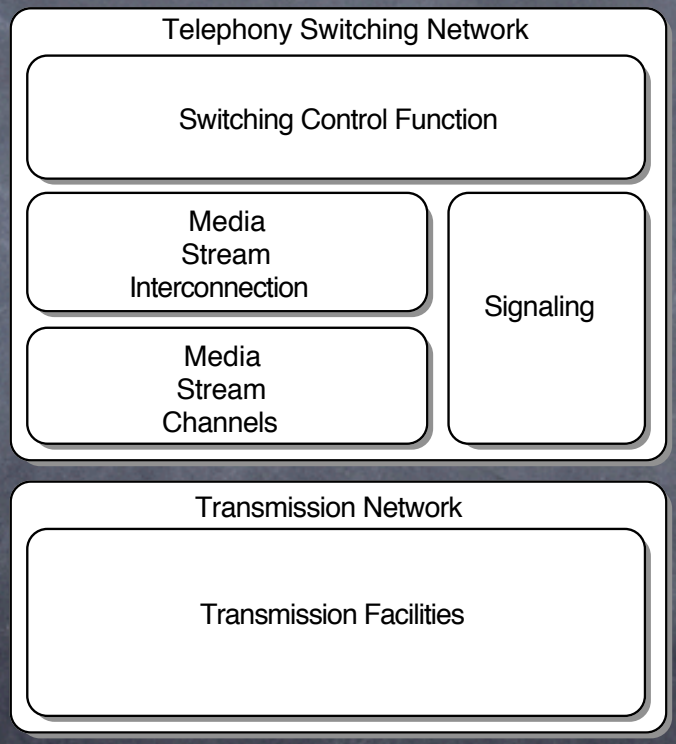


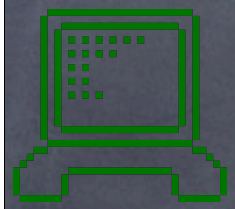
iPBX



Switching Fabric Components

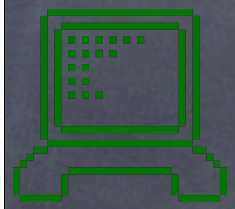






VoIP Protocols

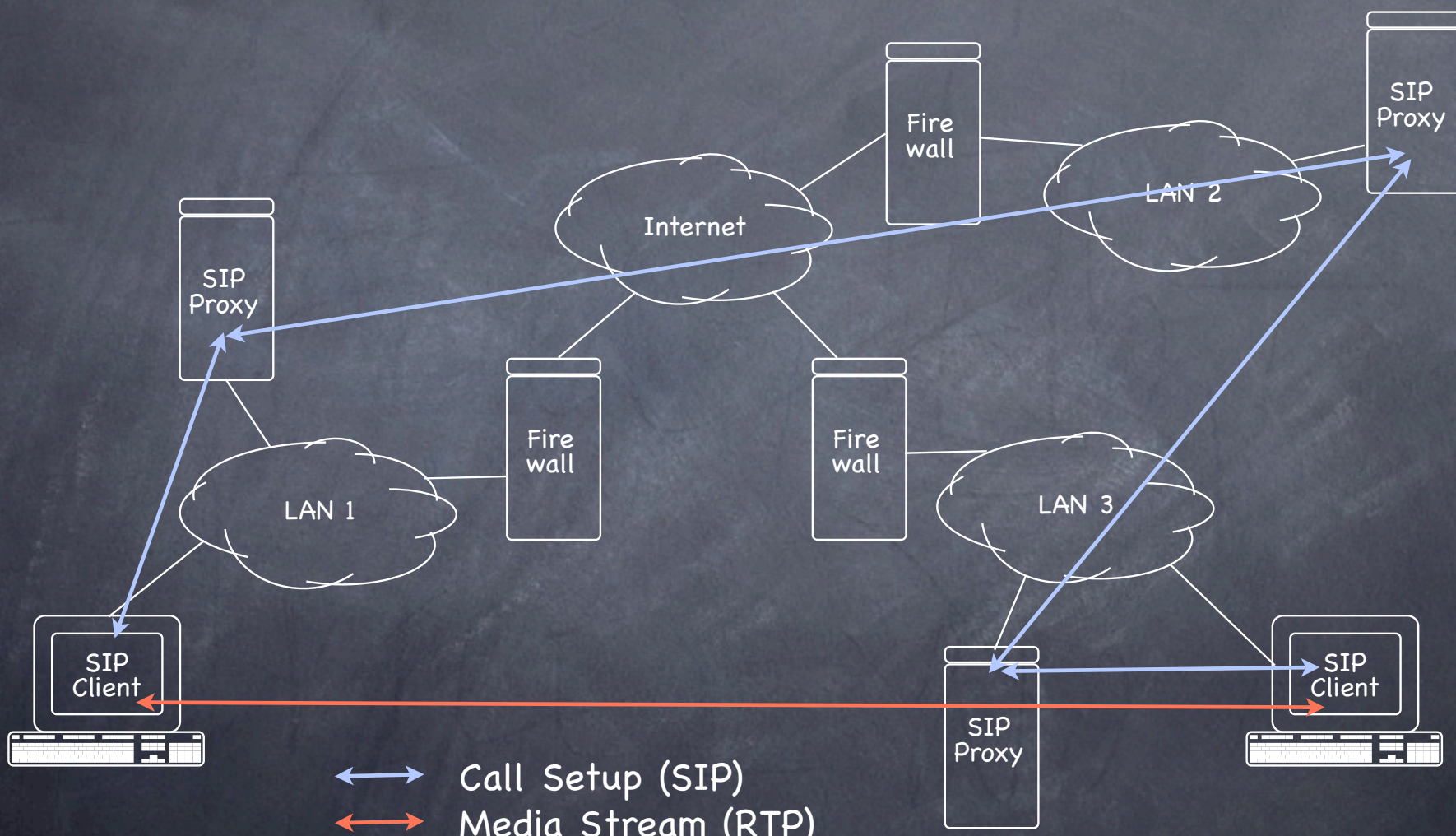
- Call Setup
  - (ITU) H.323
  - (IETF) SIP (RFC 3261, etc.)
- Endpoint Control
  - MGCP (RFC 3435, etc.) / MEGACO (RFC 3015)
- Media Transport
  - RTP (RFC 3550, etc.)
- Selected Supporting Protocols
  - DNS (RFC 1034, 1035)
  - TRIP (RFC 3219, 3872) and ENUM (RFC 2916)
  - STUN (RFC 3489)



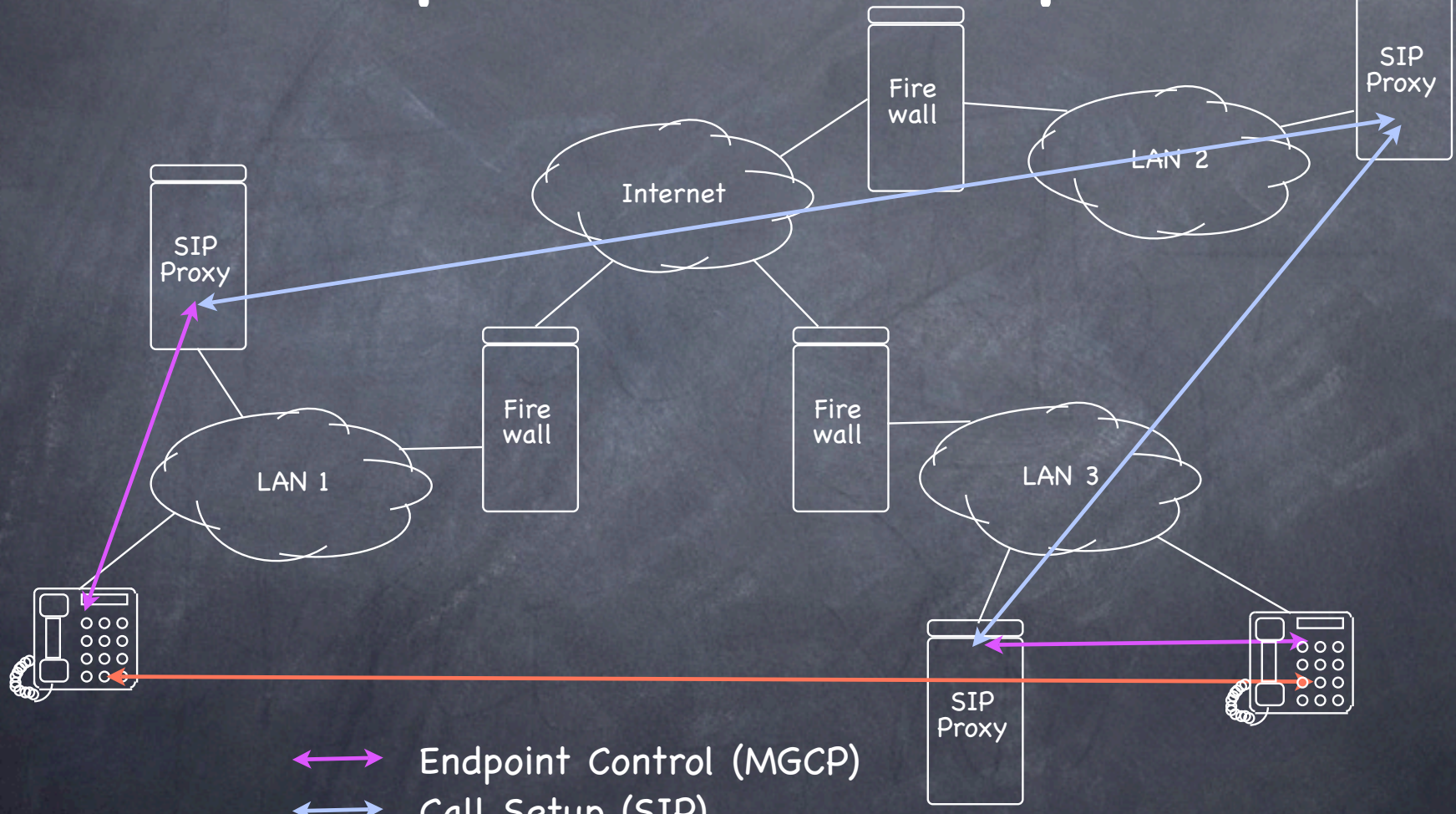
Session Initiation Protocol

- Used to negotiate and set up a session of any kind. Can be used for Voice, Video, IM, etc.
- Bandwidth reservation implementation dependent
- HTTP-like request/response protocol using text and three digit numbered response codes
- SIP roles:
  - SIP User Agents
  - SIP Proxy Servers and Redirect Servers
  - SIP Registrar and Location Servers
- Establishes user presence

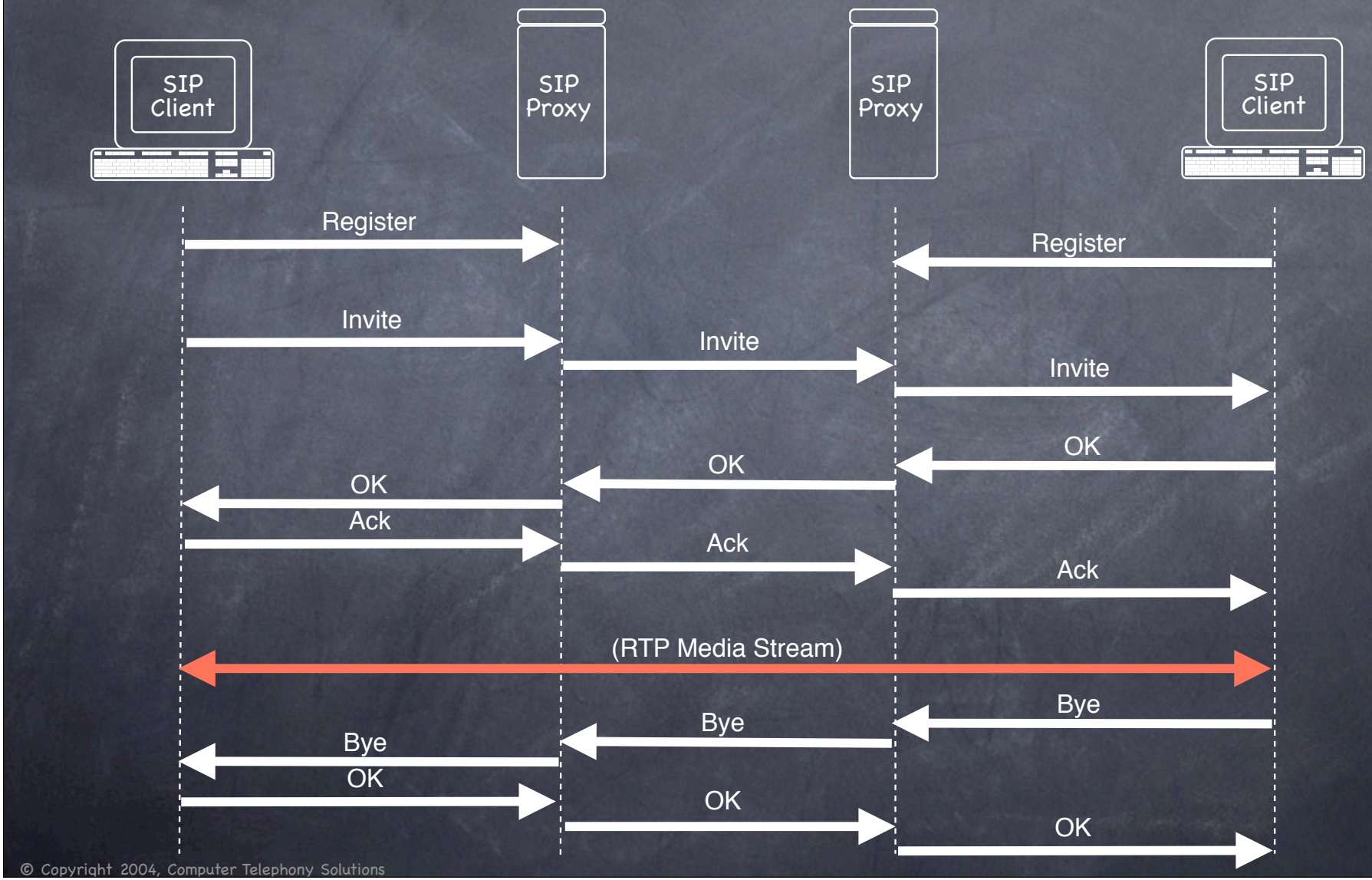
SIP Topology

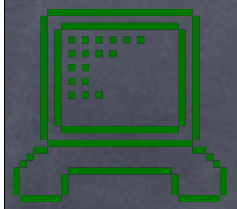


SIP with Dependent Endpoints



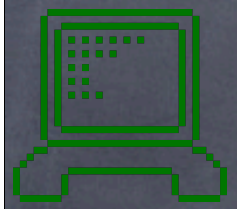
SIP Flow Example





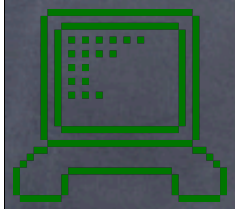
Presence and Instant Messaging

- Presence involves tracking the address(es) and status of a given person or resource.
- "Buddy List" used for instant messaging is an example of presence.
- SIP's registration process establishes presence by binding a particular address with a SIP URI.
- Competing IETF efforts for IM and Presence:
  - SIMPLE (a SIP extension)
  - XMPP (formerly Jabber, now RFC 3920/3921)



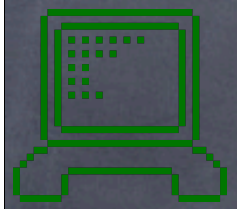
Telephony and Instant Messaging

- Presence and use of SIP for audio and video conferencing suggests an opportunity for integration with telephony
- Microsoft has demonstrated telephony integration using its new LCS Server and client involving special CTI sessions established using SIP
- Presence can be used by call control software to route calls and IM as a simple call control user interface



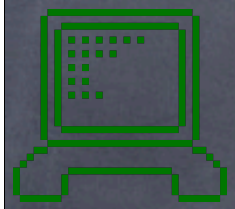
iChat

- Primary "built-in" user interface for presence and instant messaging.
- Uses a variety of different protocols simultaneously:
  - AIM (AOL proprietary)
  - Rendezvous
  - SIP
  - XMPP (Jabber)

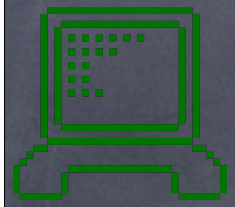


Asterisk

- Open Source PBX Software
  - Ported to Linux, BSD / Mac OS X
- Switching fabric agnostic
  - Supports SIP, H.323, IAX (proprietary)
  - Supports POTS, T-1, E-1 but drivers for Mac OS X not yet available



Demo:
Configuring Asterisk



Roadmap for Deployment

ABCDs of CT Solutions

- **A** Analyze
- **B** Build/Buy/Borrow
- **C** Create/Combine
- **D** Deploy

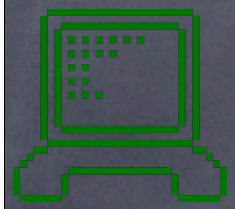
ABCDs of CT Solutions

A Analyze

Build/Buy/Borrow

Create/Combine

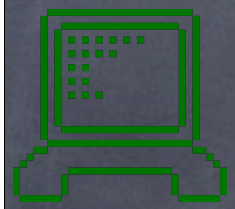
Deploy



Analyze

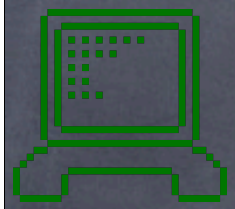
A

- Get up to speed on technology
  - Technology roadmap
  - Industry trends
  - Key concepts and terminology
- Determine your planning horizon and timeline
- Establish your requirements
  - System analysis
  - Situational analysis
  - Needs analysis
- Goal: A checklist of requirements



A Few Key Pieces of Data

- Call volume
  - Incoming
  - Outgoing - local / long distance / international
  - Internal - local / remote / home office
- Call breakdown
  - Sales / Support / Vendors / Press / Employee
  - Geographical distribution
  - Origination - Residential / Enterprise / Mobile
  - Time of day
- Key collaboration/workflow scenarios
  - Opportunities to use IM, Voice Chat, Video



Solution Components

Telephony Aware Applications

Customized Telephony Applications

Screen Based Telephone Application

Programmed Telephony Application

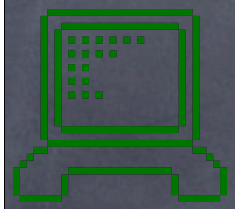
APIs/Protocols for Customization

Telephony Devices and Links

Telephony Network / Equipment

Telephony Infrastructure

Telephony Services

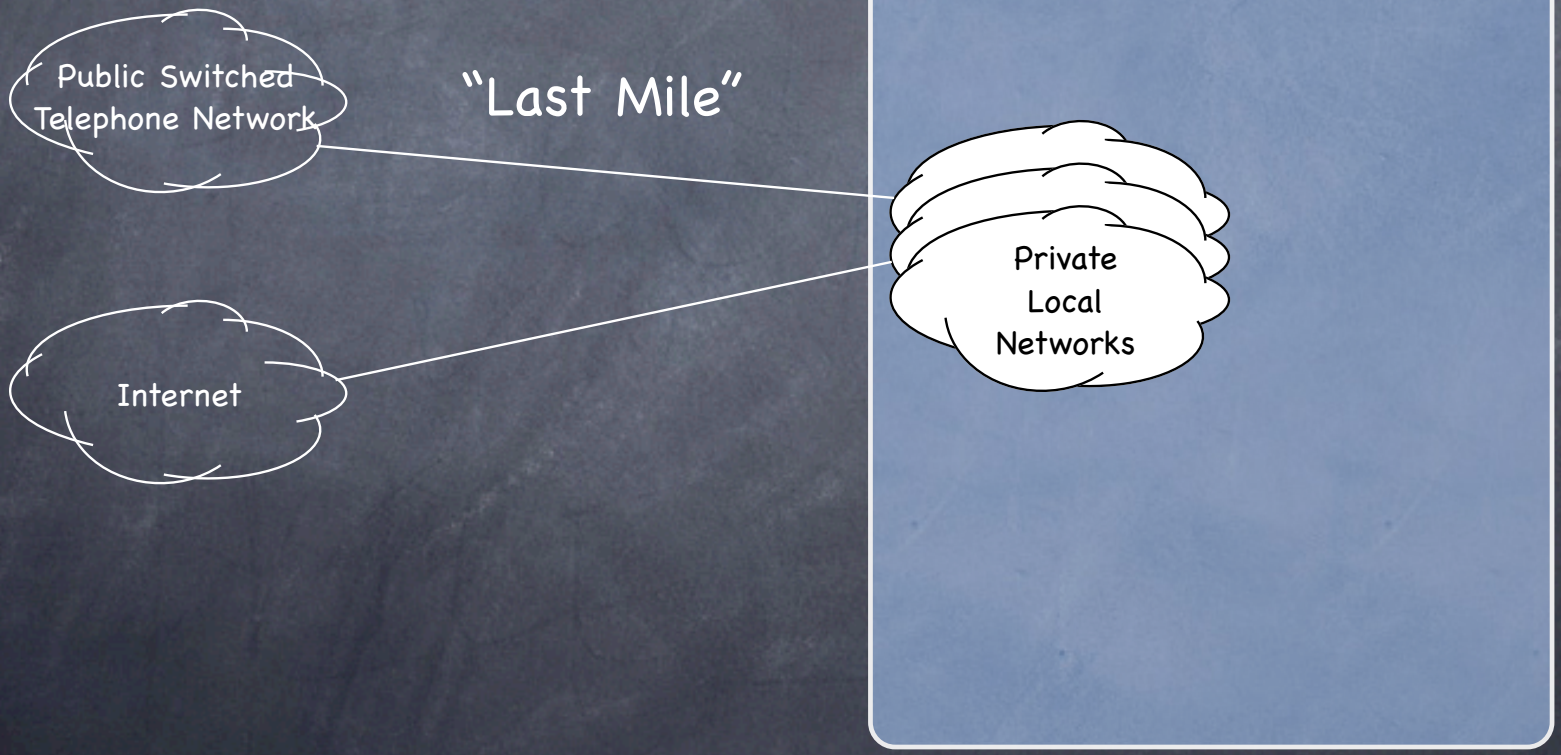


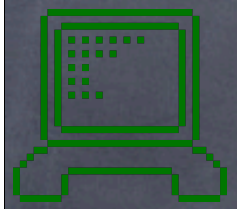
Requirements Checklist

Telephony Services

Getting Telephone Service

Public Networks

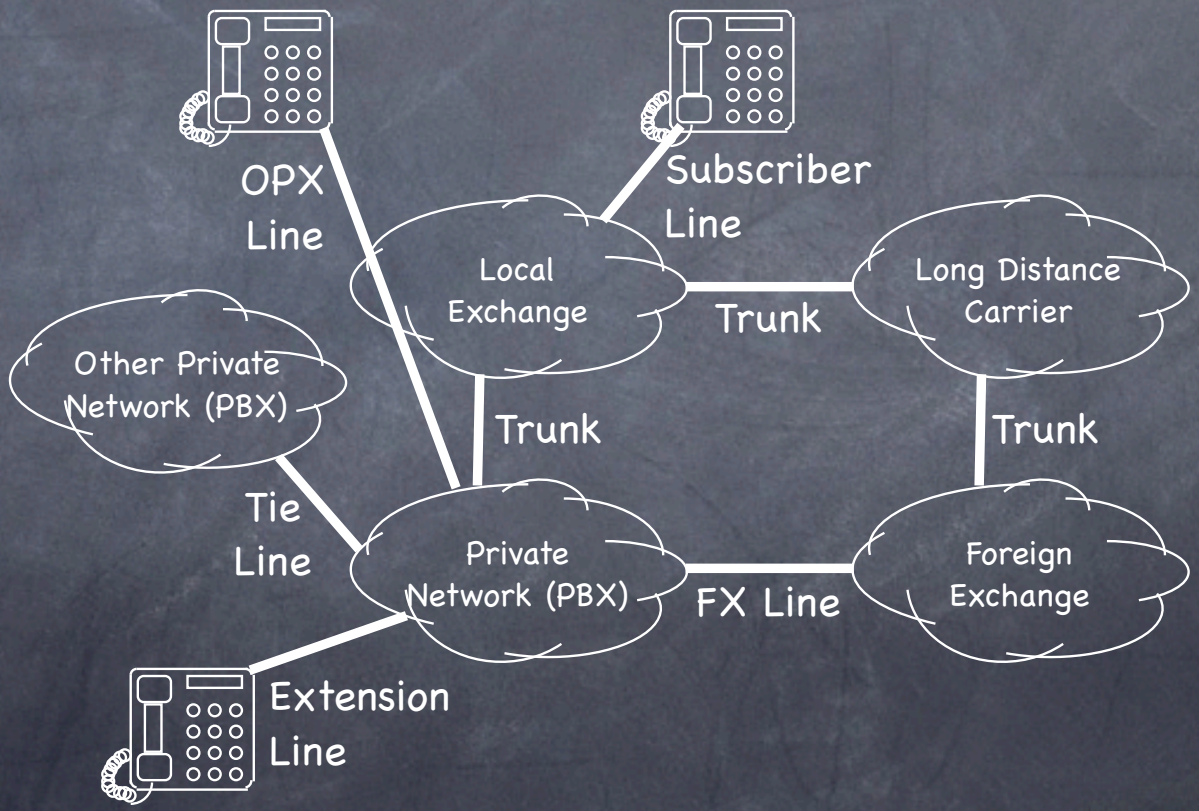


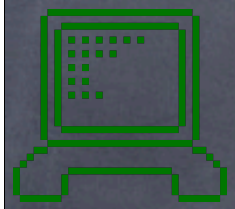


Connecting to the World's Networks

- Analog loops (aka POTS)
- TDM spans (ISDN, T1, T3, etc.)
  - Voice / Packet
- xDSL Packet
  - Symmetrical / Asymmetrical
  - Dedicated lines / Superimposed on analog
- CableTV
- Satellite
- Fixed Wireless
- Roaming Wireless

Link Terminology

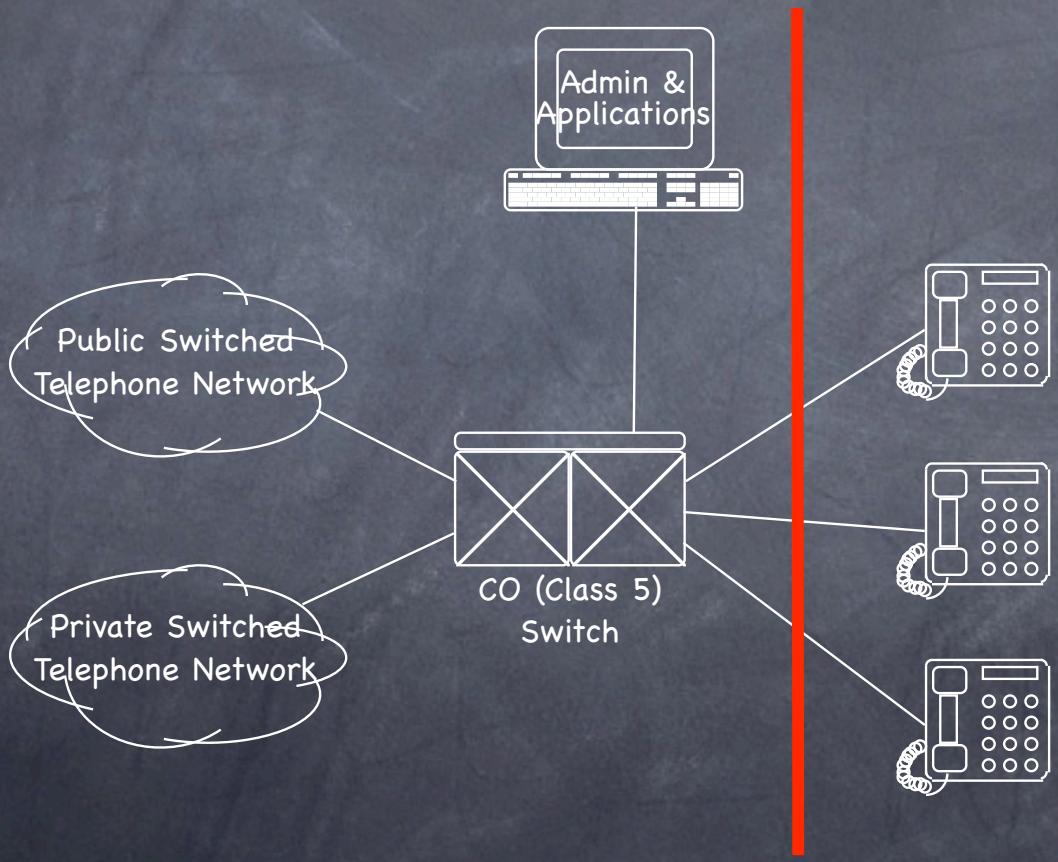




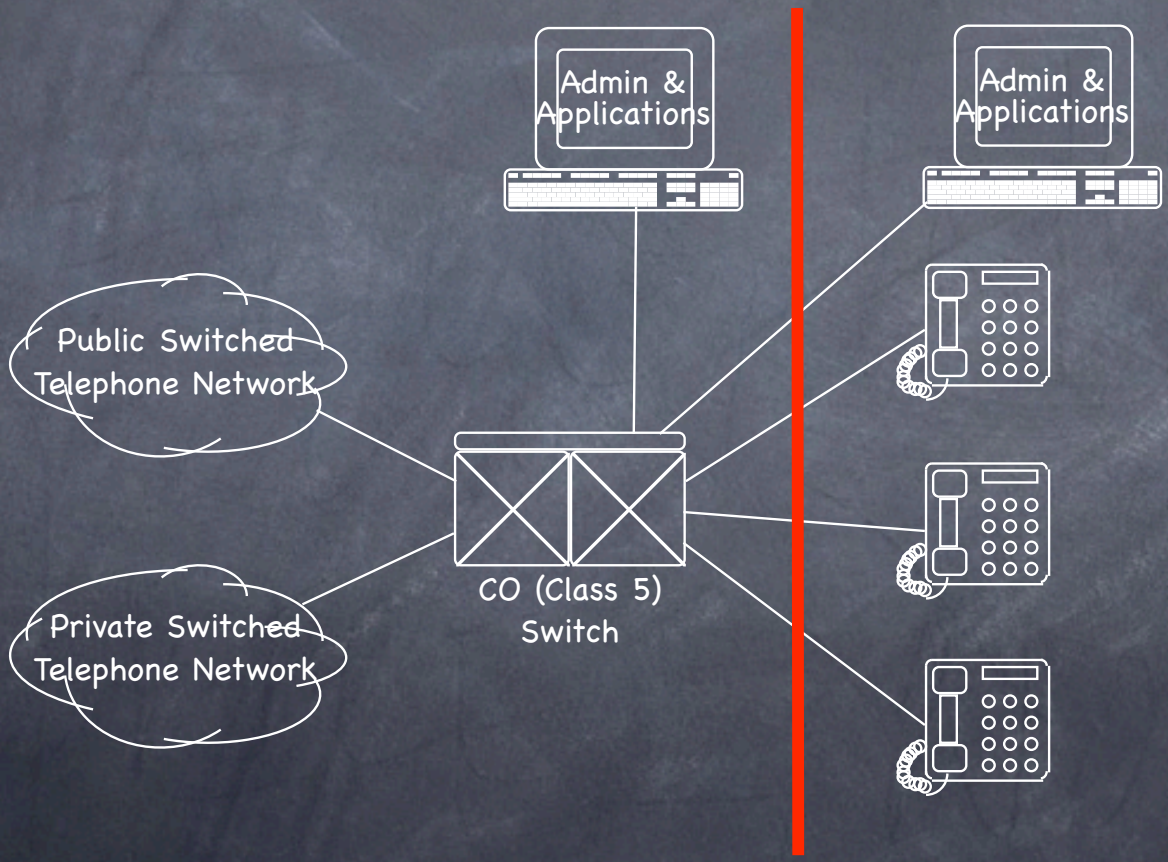
Service Providers

- Local Exchange Carrier
  - ILEC
  - CLEC
- Broadband Access
  - ILEC
  - CLEC
  - CableTV
  - Wireless (Satellite / Fixed)
  - Power
- InterExchange Carrier
  - Local
  - Long Distance
- Wireless Carrier
- Internet Service Provider

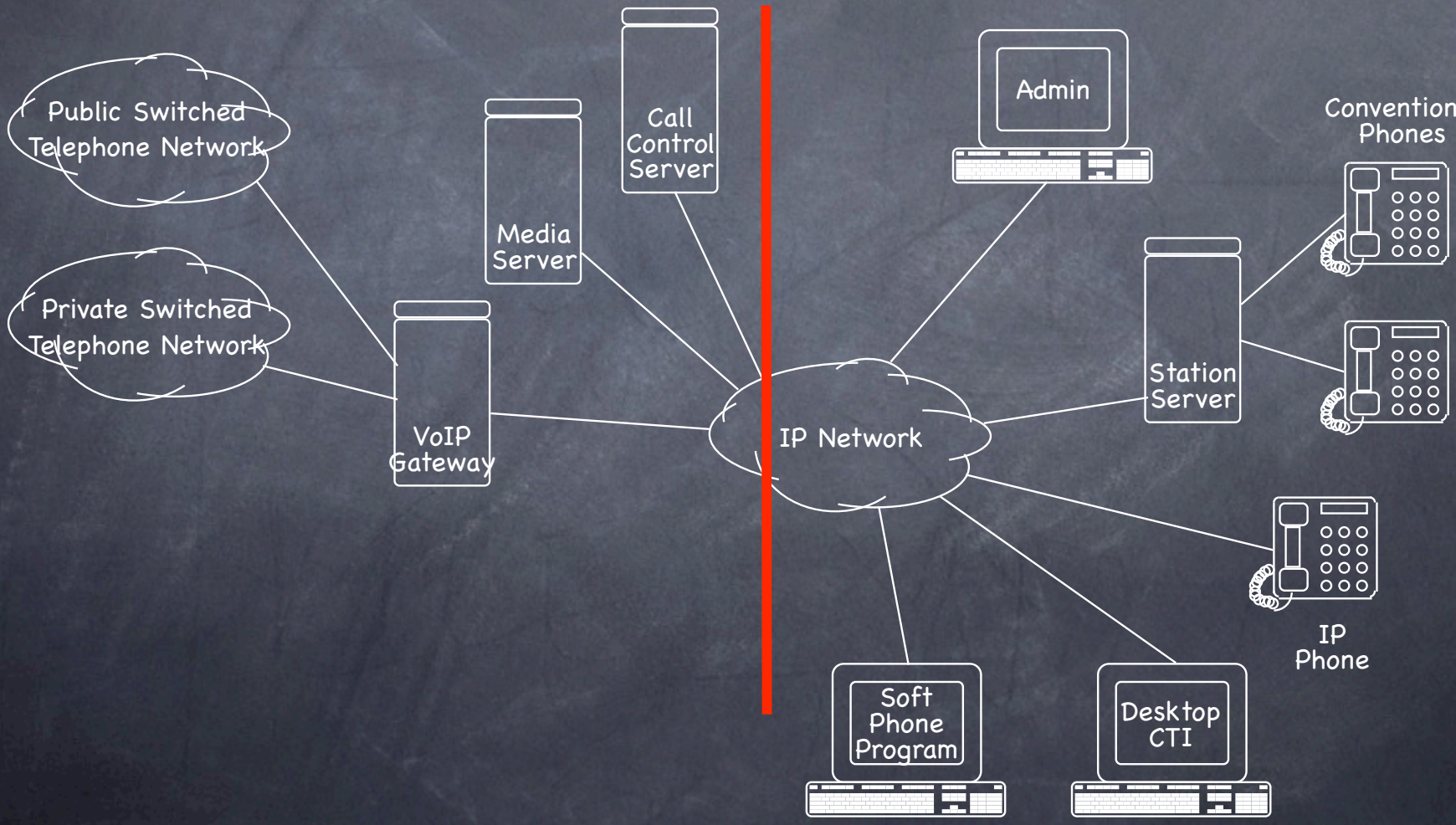
Conventional Centrex



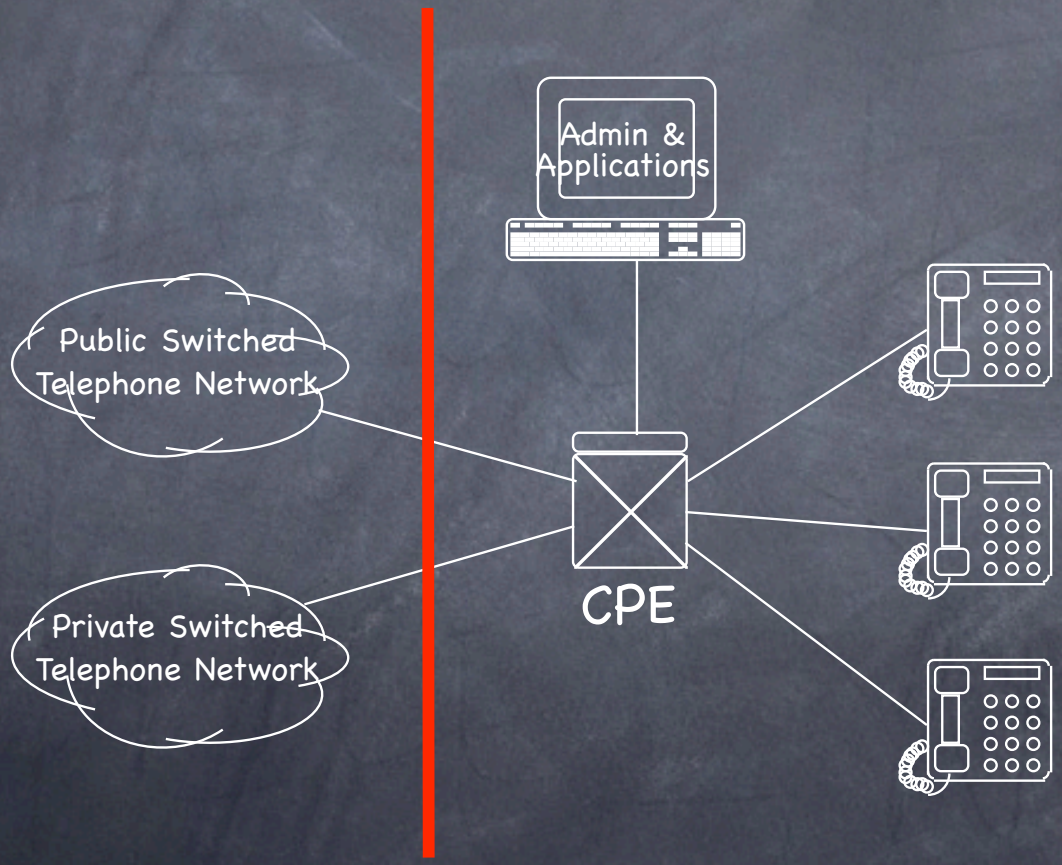
Conventional Centrex



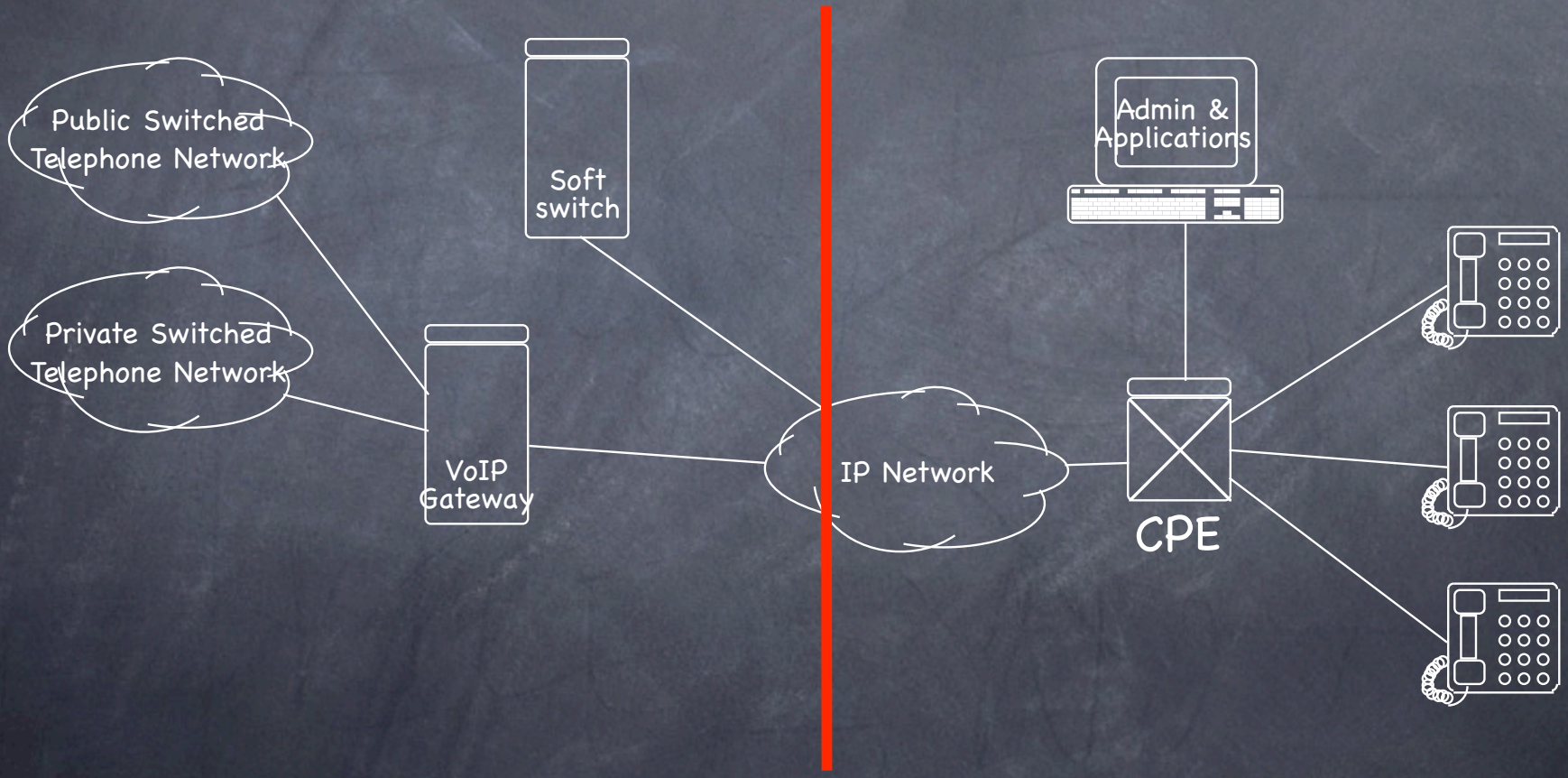
VoIP Centrex

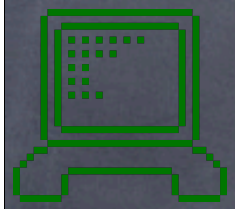


Conventional Trunked Service



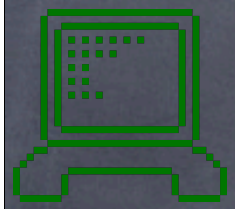
VoIP Trunked Service





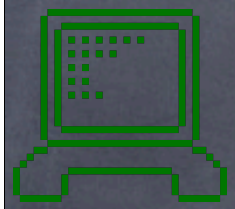
Telephony Checklist: Services

- Toll-Free
- Domestic long distance
- International long distance
- Local
- Call control features
- CTI interface
- Media Services interface
- Administrative interface



Requirements Checklist

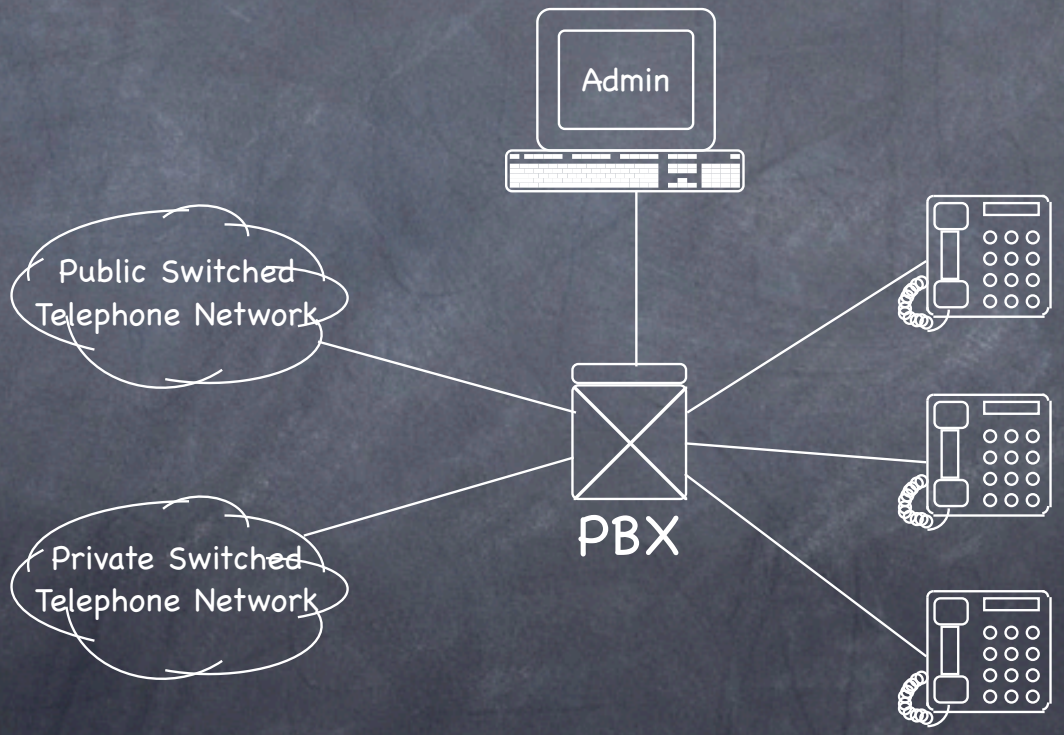
Telephony Network / Equipment



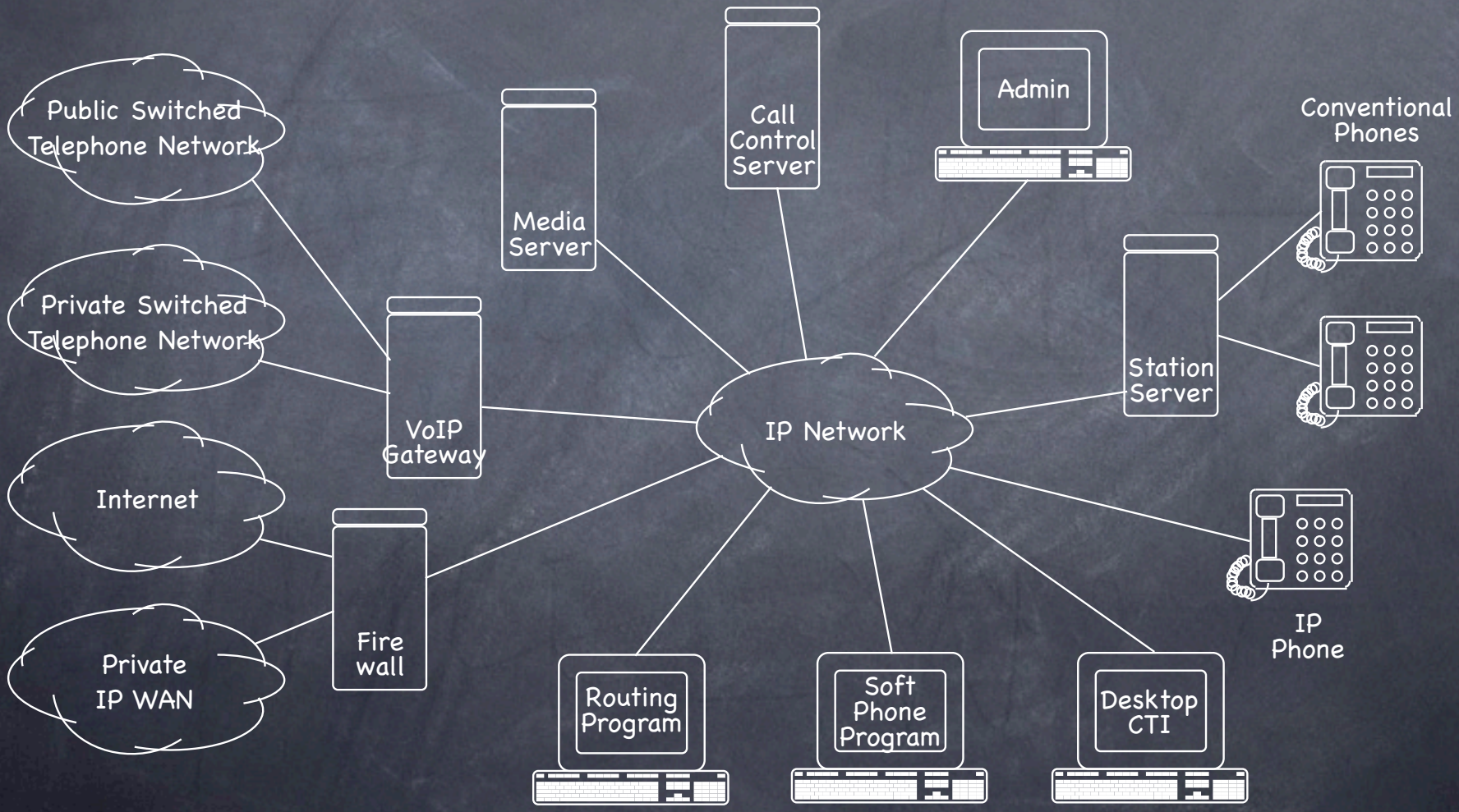
Equipment Checklist

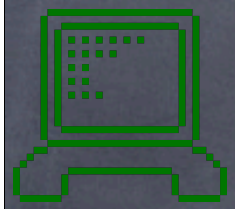
- Call Control: PBX or Server(s)
- Media Services: PBX-based or Media Server(s)
- Administration: Dedicated terminal, phone-based, web-based, CLI-based, proprietary application
- Switch fabric:
  - Cable plant
  - Switches / routers / firewalls
  - Telephones
  - Gateways / multiplexors / network interfaces
  - Power
  - Wireless telephones and access points

PBX



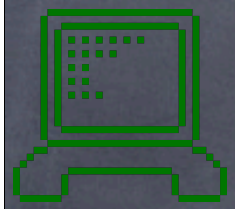
iPBX





Cable Plant

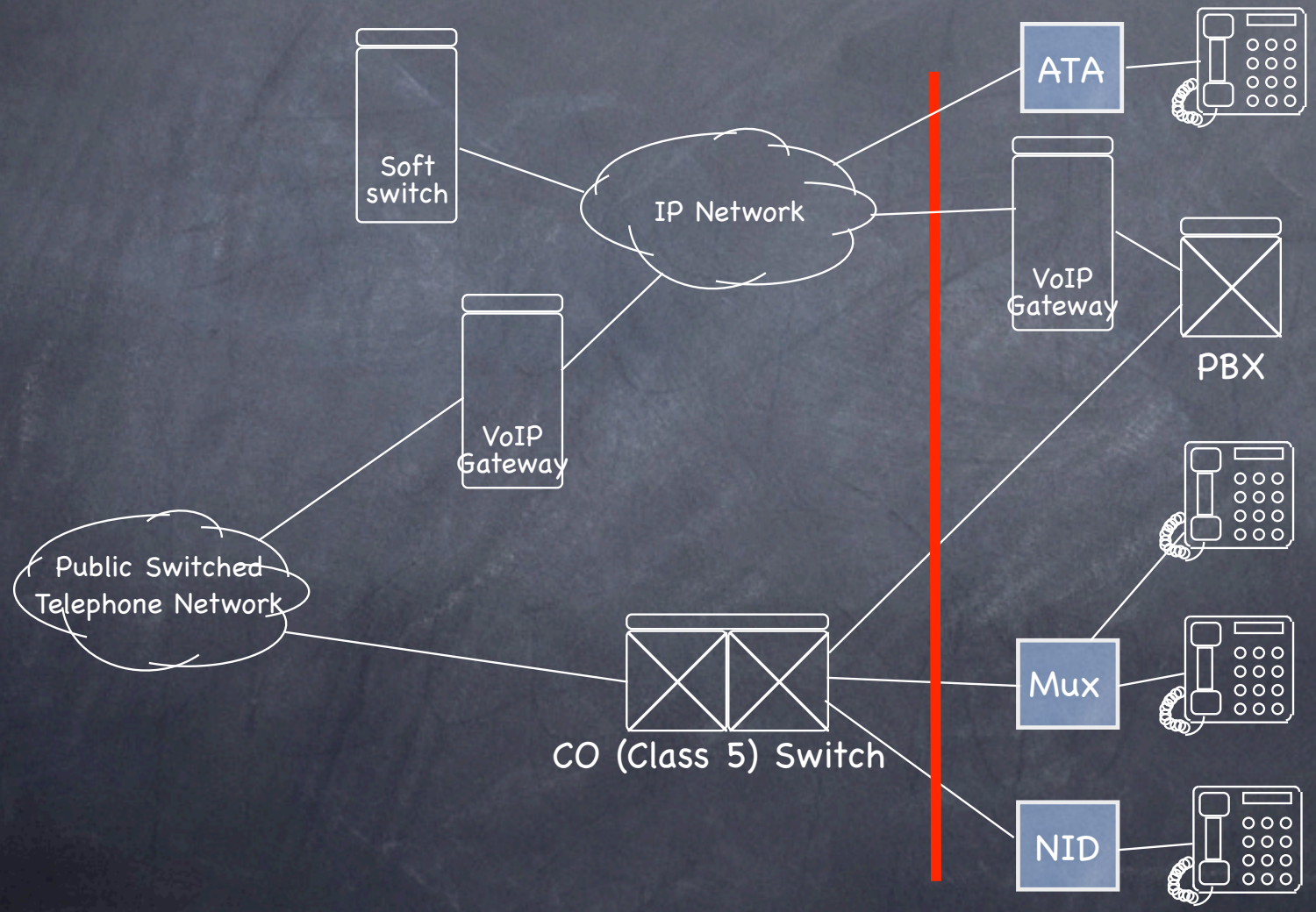
- One of the most compelling cost benefits for iPBX deployment is cable plant simplification:
  - Ethernet everywhere, versus
  - Ethernet plus voice everywhere

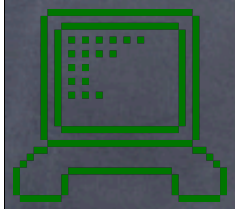


Power

- Conventional PBX / Centrex
  - Line powered phones
  - Single point of failure
  - UPS highly recommended
- iPBX
  - Many, many, many points of failure
  - Servers, switches, routers, gateways, firewalls, etc. all require uninterruptible power supplies
  - Power over Ethernet (PoE) 802.3af highly recommended.
  - PoE pulls 15.4 watts per port. Wiring closet power and UPSs must be sized appropriately.

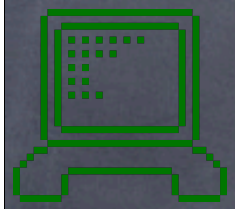
Gateways, Multiplexors, and Network Interfaces





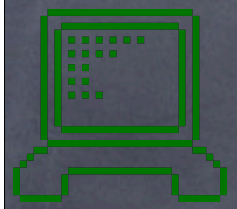
Switching and Routing

- Bandwidth planning
- VLAN
- QoS
- AAA



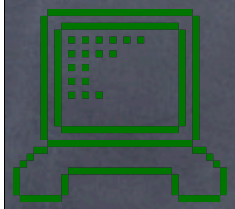
Telephones

- Conventional
  - Analog (Corded / Cordless)
  - ISDN
  - Proprietary Digital (Corded / Cordless)
- iPBX
  - H.323 Phones (Corded / Cordless)
  - SIP Phones (Corded / Cordless)
  - MGCP Phones (Corded / Cordless)
  - Softphone (SIP / H.323 / Proprietary)
- Headsets
  - Wired
  - Bluetooth



Wireless

- Conventional PBX
  - DECT / Proprietary Access points and phones
- iPBX - "VoWLAN" or "VoWiFi"
  - Today: 802.11a/b/g with proprietary extensions
  - Future: 802.11e (QoS) + 802.11i (Security)
  - Roam to/from cellular network



Requirements Checklist

Telephony Aware Applications

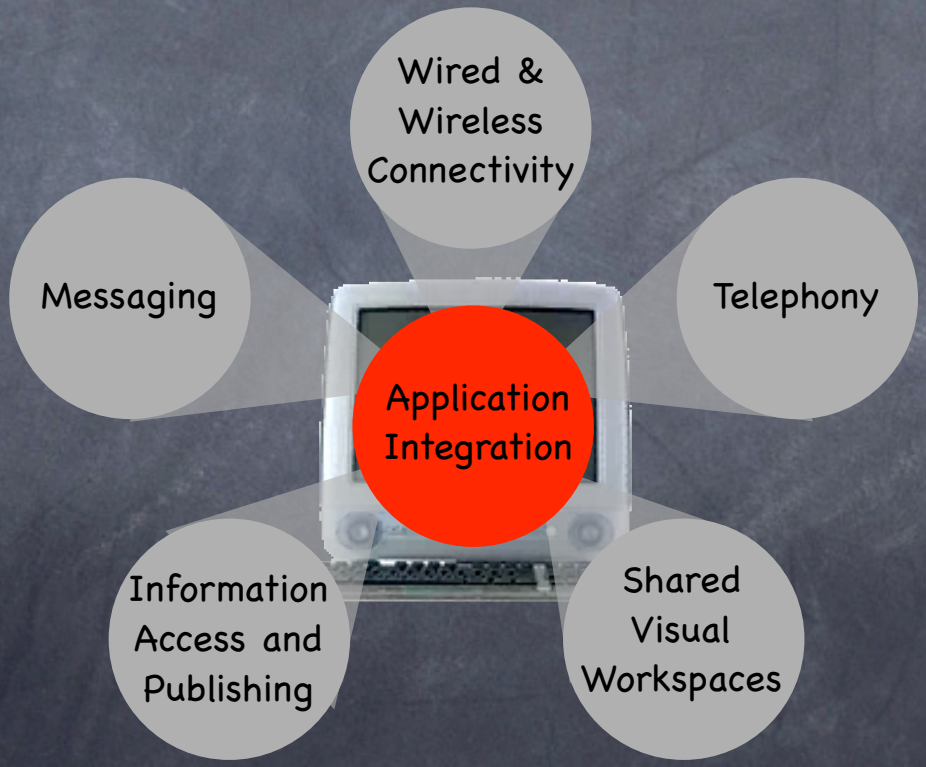
Screen Based Telephone Application

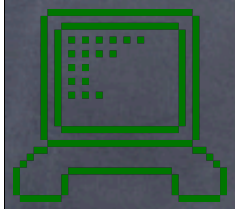
Programmed Telephony Application

Telephony Devices and Links

Application Integration

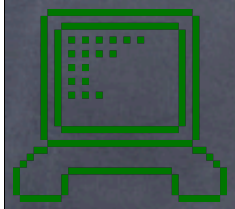
- The killer application is your existing mission-critical software integrated with communications





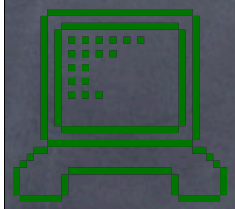
Mission Critical Applications

- Identify the key applications and make sure they support Apple Events/AppleScript
  - Upgrade if possible
  - Migrate if necessary
  - Consider rebuilding if appropriate
- Off-the-shelf mission critical applications
  - Accounting systems
  - Time and billing
  - Workflow management
  - Scheduling
  - CRM / Contact Management



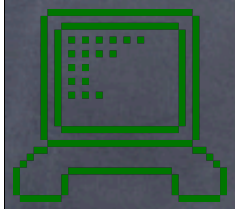
Requirements Checklist

Programmed Telephony Applications



Programmed Telephony Applications

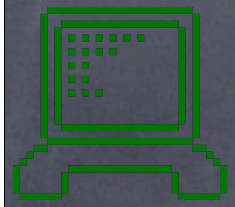
- Delegation of call management to Macintosh
- Interactive Media
  - User interface effort is focused on interactive dialog with telephone callers
  - Requires media access
- Control Only
  - Transparent to callers
  - User interface required for those performing configuration



Programmed Telephony

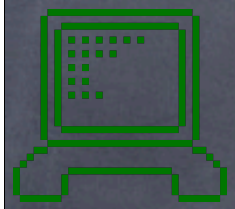
- Applications that handle inbound and/or outbound calls autonomously are programmed telephony applications.
- Programmed telephony applications are often concerned with creating a "Telephony User Interface" for callers and have a limited user interface for the local user.

Programmed Telephony Application



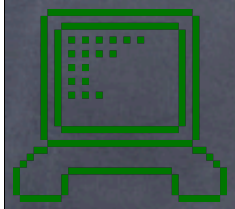
Requirements Checklist

Screen Based Telephone Applications



Screen Based Telephone Applications

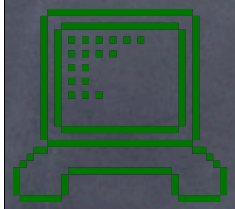
- User Interface for managing telephone calls
  - Virtual telephone on the virtual desktop
  - Variety of applications for different user requirements and personal preferences
- Target for Telephony Apple Events
- Features include:
  - call screening
  - call announcement
  - auto dialing



Screen-Based Telephony

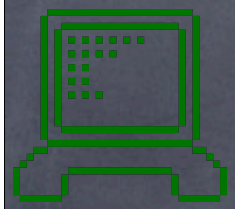
- Screen-based Telephone Applications are the foundation for productivity solutions.
- SBTs provide centralized system-wide user interface for telephony so that individual productivity applications don't confuse the user experience.

Screen Based Telephone Application



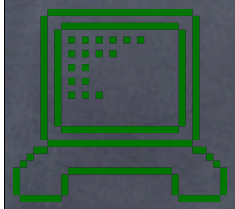
Requirements Checklist

Telephony Aware Applications



Telephony Aware Applications

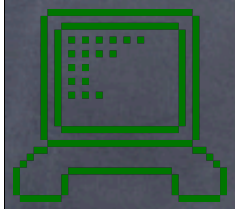
- Mainstream applications that can be integrated with telephony applications
  - PIMs
  - Databases
  - Calendar
  - Accounting Systems
- Use Apple Events and AppleScript



Telephony Aware Applications

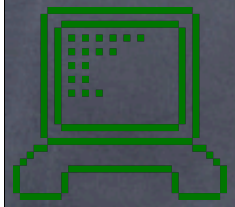
- Users want their existing application to work with their telephone(s).
- Productivity and mission critical applications that are "telephony-aware" are the "killer applications" in telephony solutions.

Telephony Aware Applications



Requirements Checklist

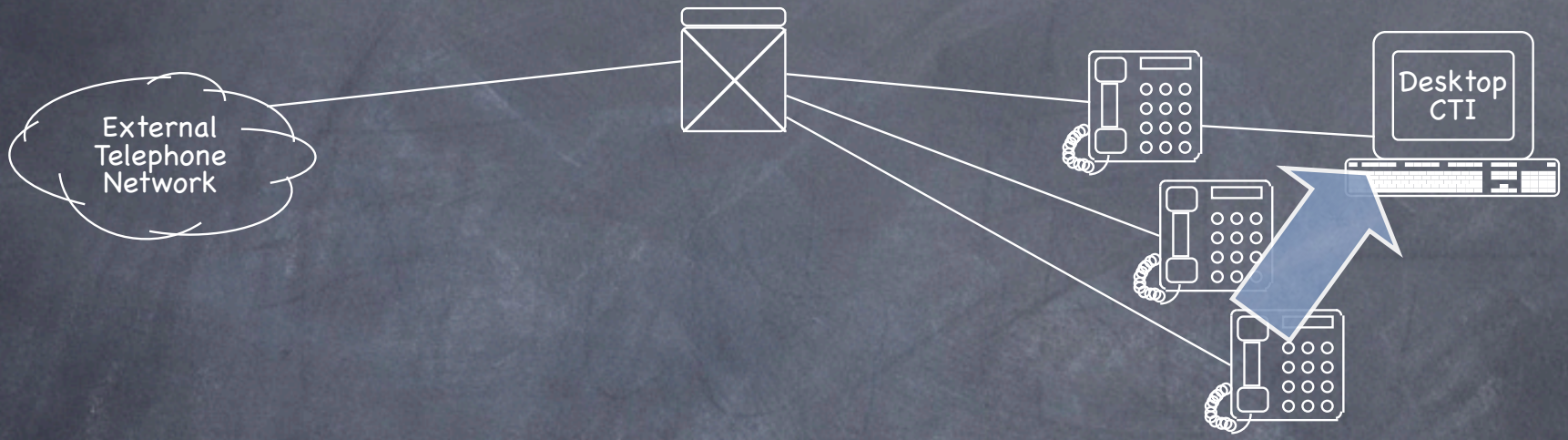
Telephony Devices and Links



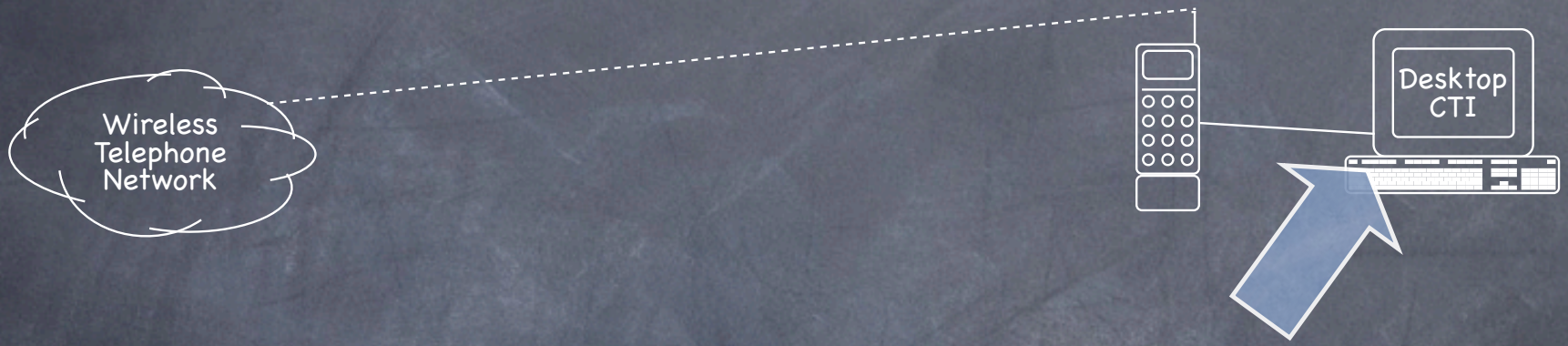
CT Interface

- Call Control
  - CTI Applications
- Media Services
  - Interactive / Fax / Modem

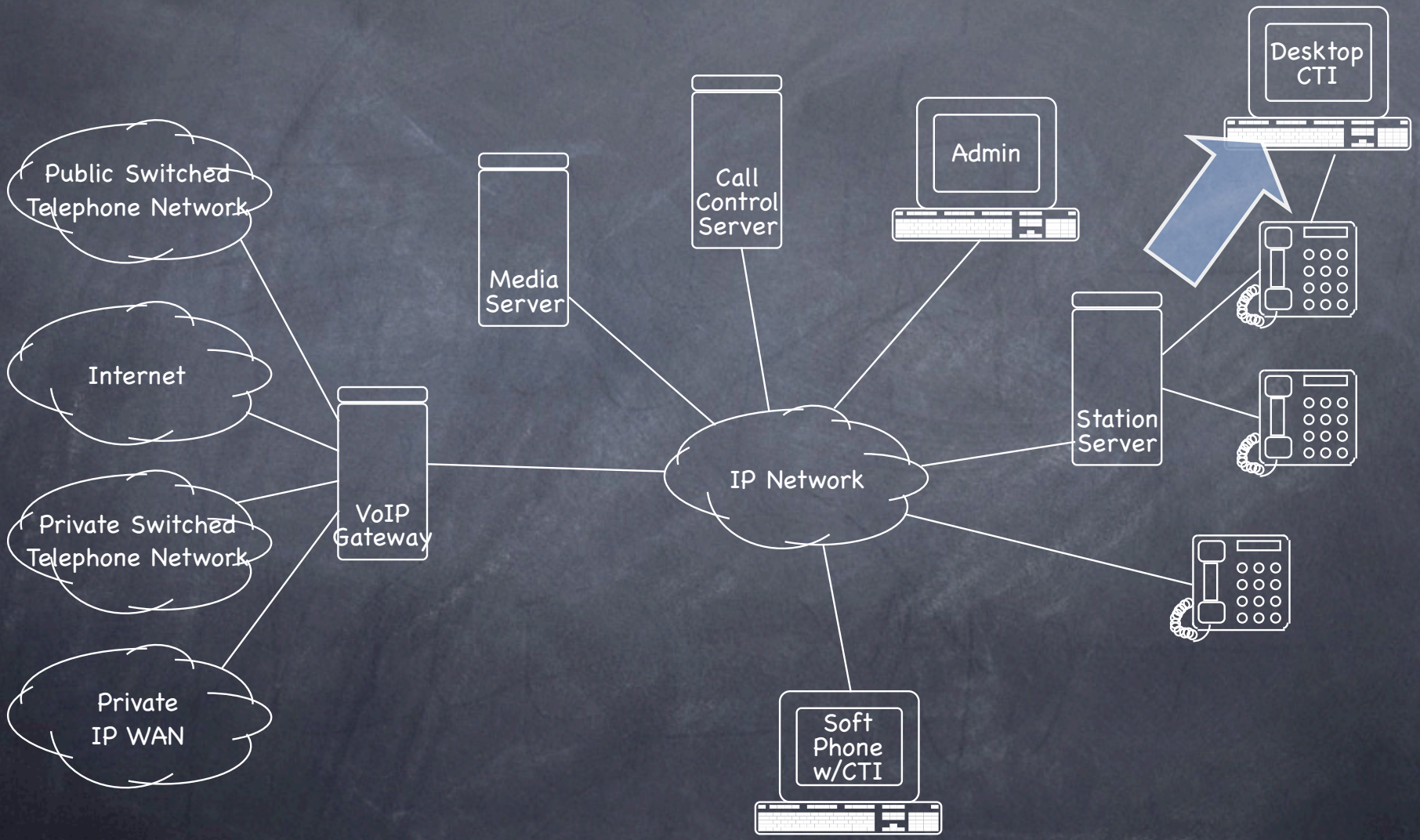
Direct Connect



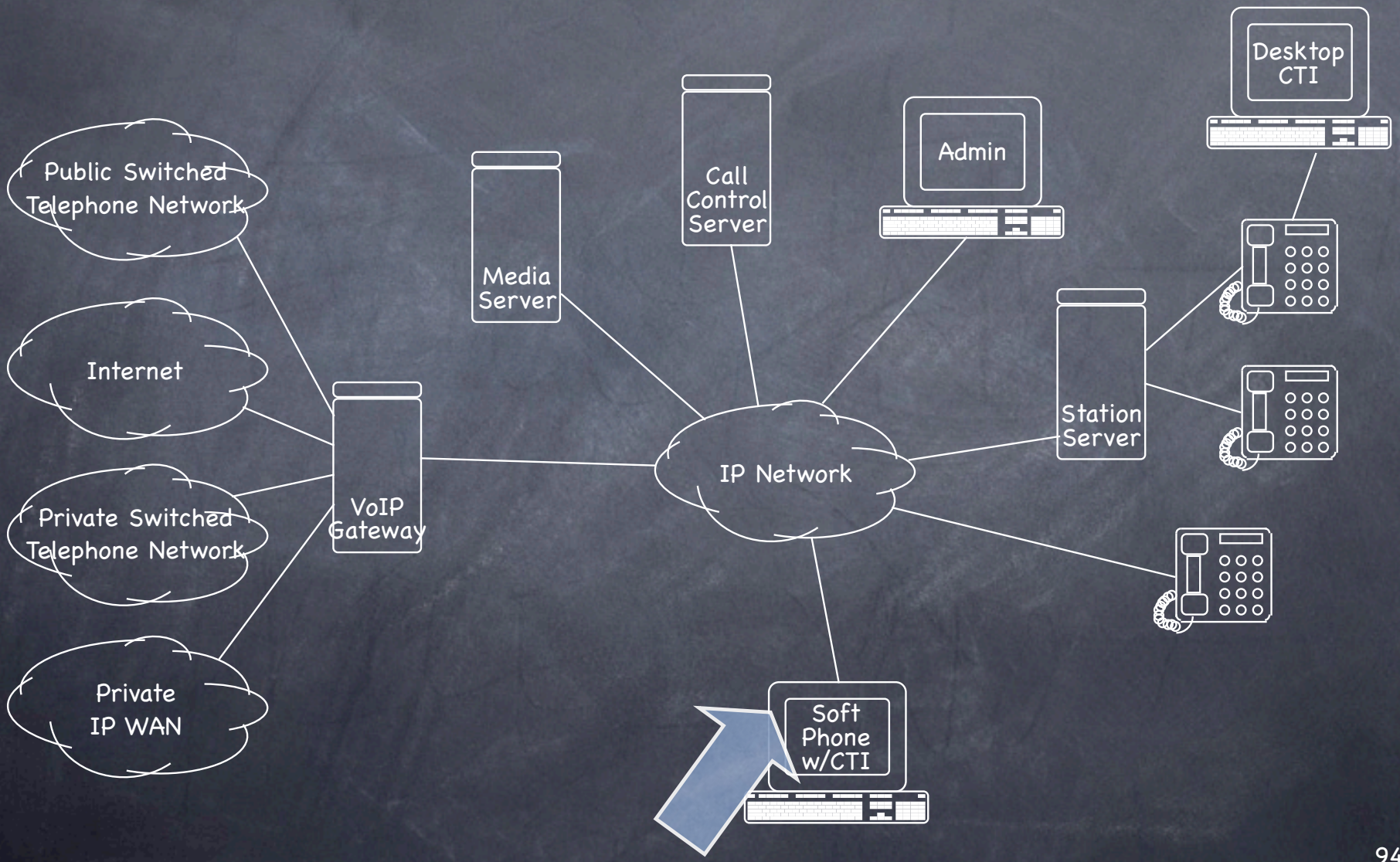
Direct Connect



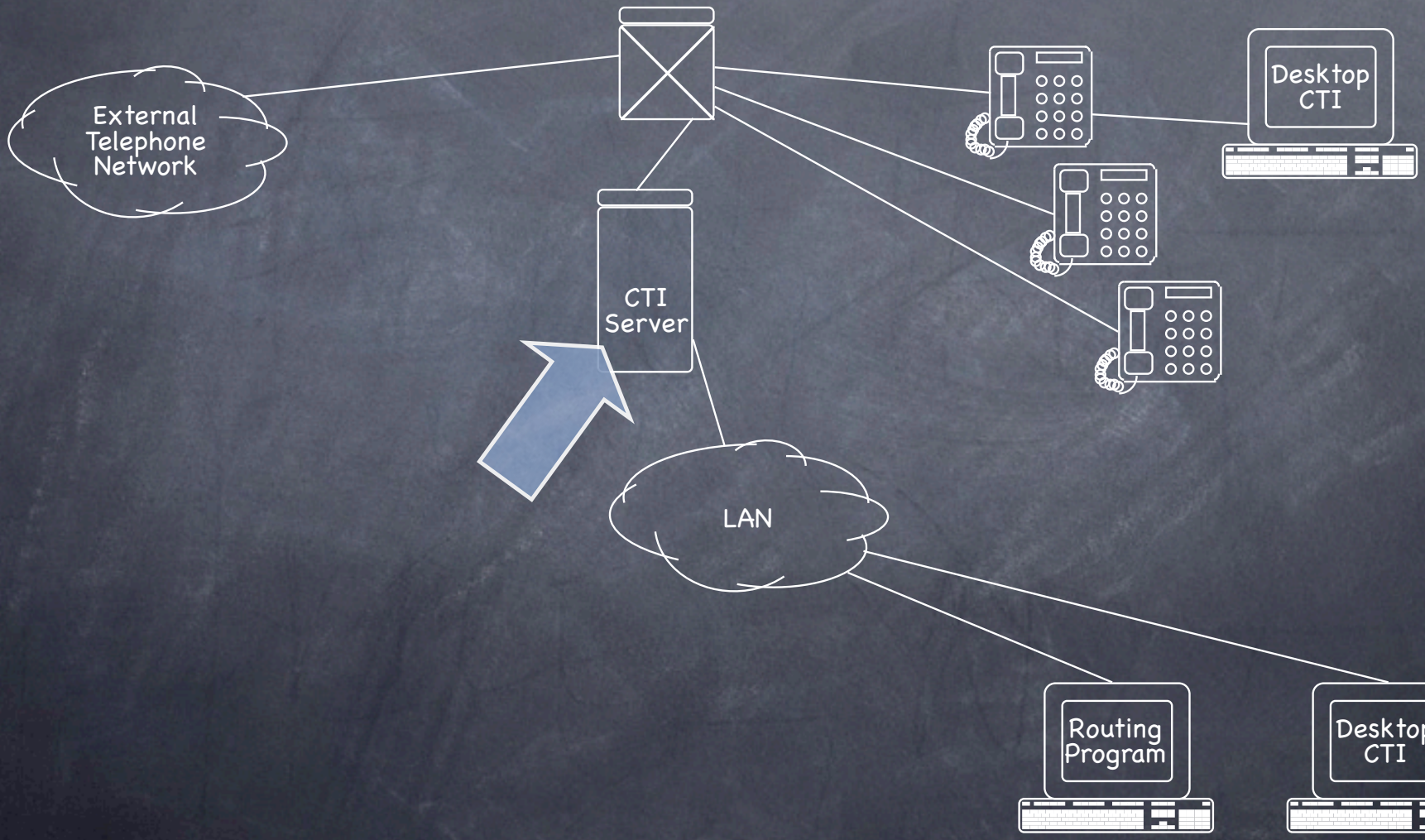
VoIP Direct Connect



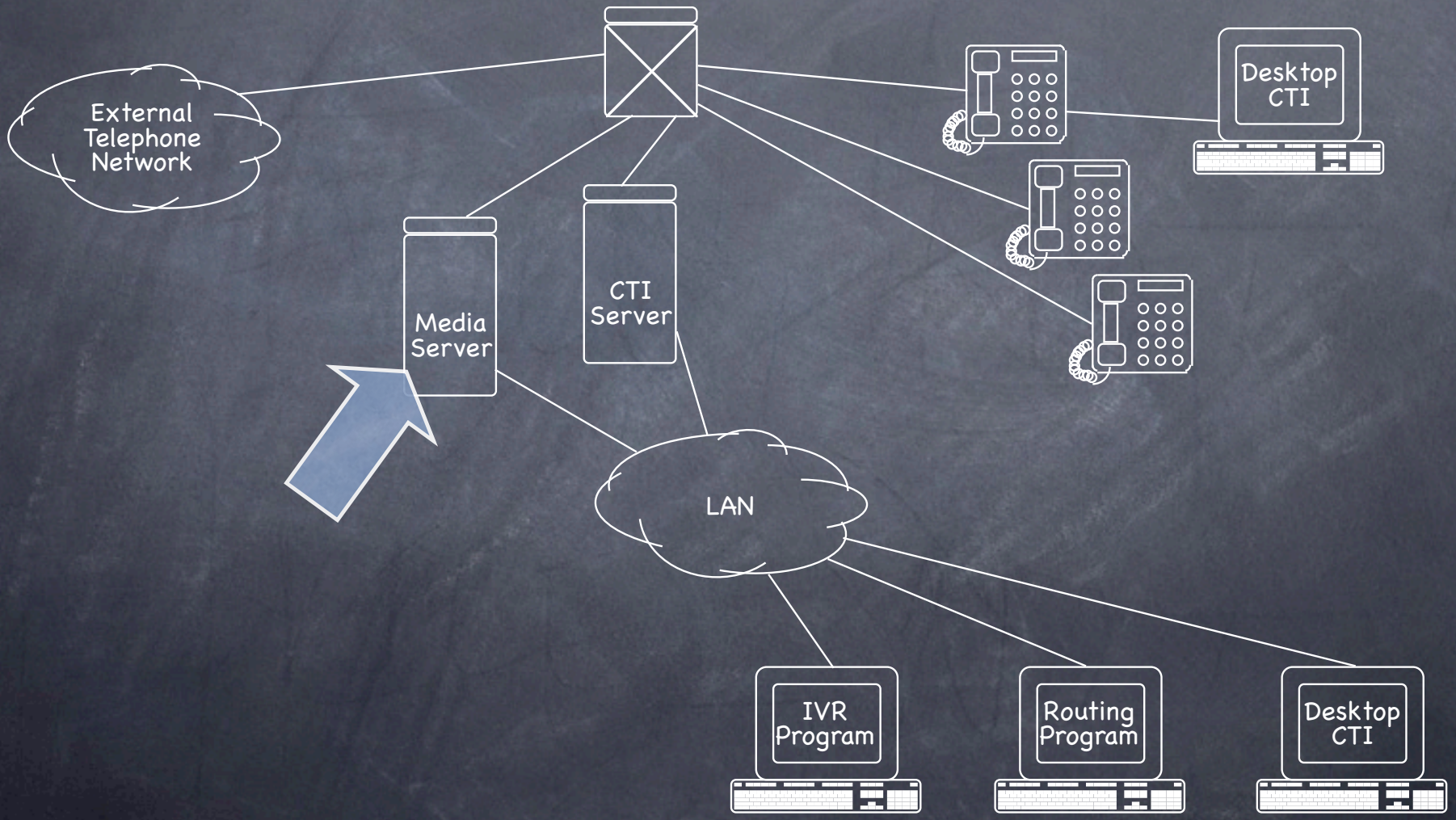
VoIP "Soft Phone"

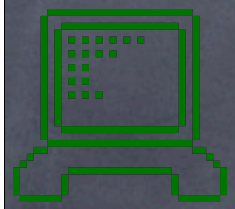


Client-Server



Telephony Media Server





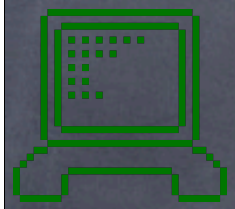
ABCDs of CT Solutions

Analyze

B Build/Buy/Borrow

Create/Combine

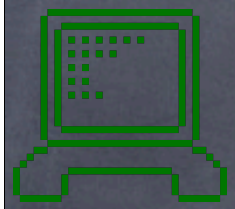
Deploy



Build / Buy / Borrow

B

- Identify and evaluate implementations of needed functionality
- Identify and evaluate tools
- Identify sources and prices
- Weigh advantages and disadvantages of:
  - Building - Implementing the functionality yourself
  - Buying - Purchasing an off-the-shelf solution
  - "Borrowing" - Using a service provider
- Goal: A shopping list



Solution Components

Telephony Aware Applications

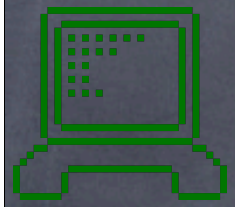
Screen Based Telephone Application

Programmed Telephony Application

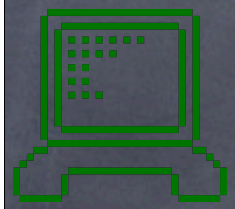
Telephony Devices and Links

Telephony Network / Equipment

Telephony Services

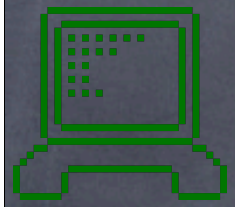


Telephony Services

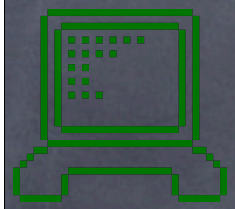


Telephony Services

- One or more of:
  - Integrated Communication Providers
    - e.g. Covad, XO, Comcast
  - Broadband Telephony Provider + ISP
    - e.g. CallVantage, Lingo, VoiceWing, Vonage
  - Conventional ILECs / CLECS
    - e.g. Quest, SBC, Verizon

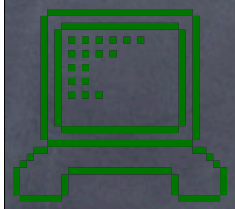


Telephony Network / Equipment



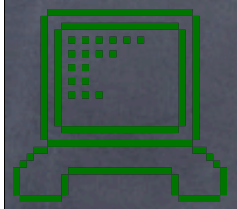
Scenarios

- Conventional Centrex
- IP Centrex
- Conventional PBX (or KSU)
- Hybrid PBX
- "Software PBX"
- iPBX



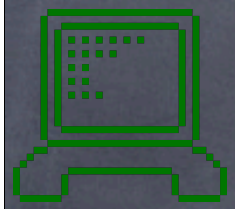
Conventional Centrex

- Voice and Data cabling
- Phones
- Mux / NIDs
- UPS



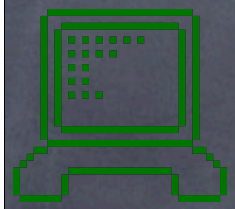
Conventional PBX Equipment List

- PBX / KSU
  - optional built-in media services
- Voice and Data cabling
- Phones
- Media servers
- Gateways / NIDs
- UPSs



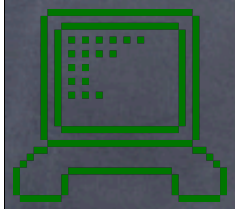
IP Centrex List

- IP phones and/or Station servers and phones
- Firewalls
- IP Switches and Routers
  - Bandwidth
  - VLAN Support
  - Manageable QoS
  - PoE
- UPSs
- Ethernet



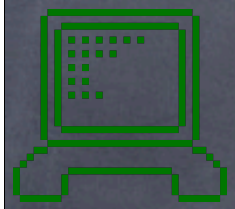
iPBX Equipment List

- Call control server(s)
- Media servers
- IP phones and/or Station servers and phones
- Firewalls
- VoIP Gateways
- IP Switches and Routers
  - Bandwidth
  - VLAN Support
  - Manageable QoS
  - PoE
- UPSs
- Ethernet

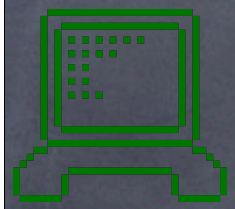


Software PBX: Asterisk

- Asterisk Open Source Project
- Recently ported to Mac OS X
- Mac OS X lacks drivers for telephony PCI cards for so it supports only VoIP



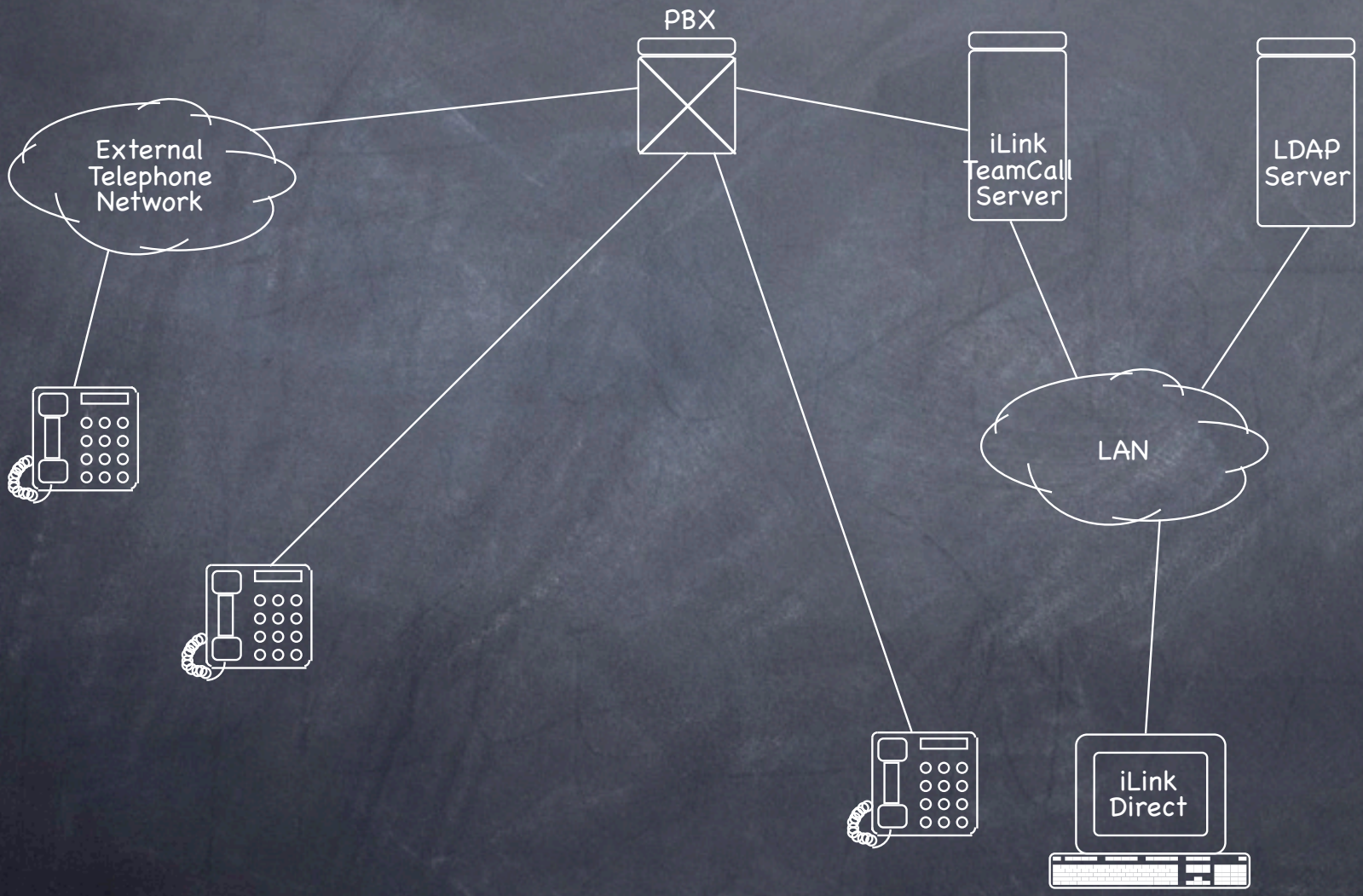
Telephony Devices and Links

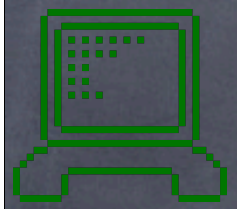


Direct Connect Options

- Line Interfaces
  - Built-in Modems
  - Serial/USB External Modems
  - Computer Telephony Devices
- Phone Interface
  - USB
  - Bluetooth
- Servers
  - Off-the-shelf
  - Build-your-own

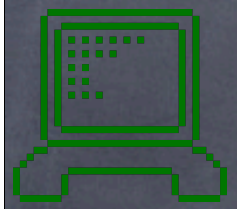
iLink TeamCall Server





Media Servers

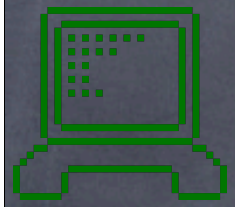
- Hosted VXML Media Services
  - e.g. BeVocal, TellMe, TuVox
- ECTF-based open Media Server



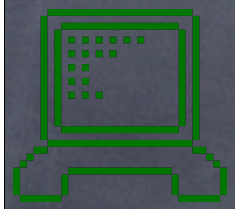
Telephony Devices/Links

- Users want access to their analog lines, digital PBX lines, VoIP, and cellphones in any combination.
- Users want a single SBT for all lines.
- Users don't want to have to pick their applications based on their phone service.

Telephony Devices and Links

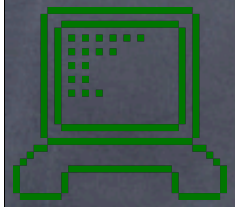


Programmed Telephony Applications

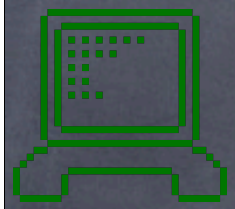


Programmed Telephony

- OvoLabs Phlink
  - Requires OvoLabs USB hardware
- MegaPhone Company PhonePro
  - Uses voice modems and GeoPort

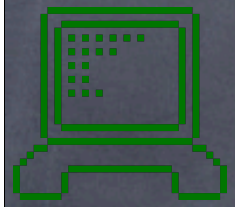


Screen Based Telephone Applications

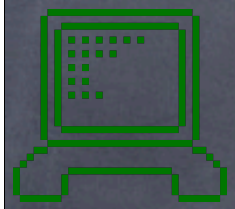


Screen-based Telephony

- MegaPhone Company MegaPhone
  - Uses voice modems and GeoPort
- Parliant Phone Valet
  - Requires Parliant's USB hardware
- XTen X-Lite and X-Pro
  - SIP-based softphone
- Jonathon Nathan Jon's Phone Tool
  - Piggy backs on other software

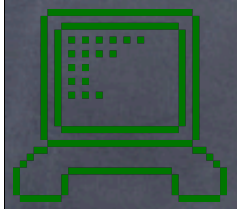


Telephony Aware Applications



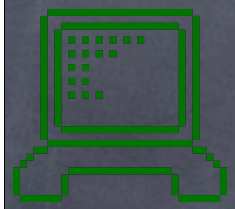
The "Build" Option

- Build your own private network / VPN
- Build your own voice-mail
- Build your own IVR system
- Build your own CRM system
- Customize your telephone/PBX features
- Build your own fax solution
- Build your own unified messaging solution
- Build your own e-commerce infrastructure
- Build your own security system



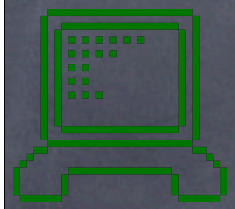
Final Shopping List

- Services
- Off-the-shelf hardware and software
- Development tools
- Administrative tools
- Don't forget those UPSs...



Can't Get There From Here?

- The components you need for the solution you want may no be available or affordable
- If so, revisit your timeline
  - Consider deferring your project
  - Consider a phased approach
  - Consider joining coordinated effort to lobby the vendors in question



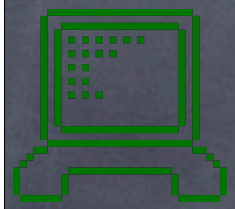
ABCDs of CT Solutions

Analyze

Build/Buy/Borrow

C Create/Combine

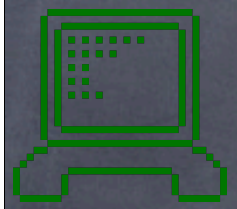
Deploy



Create / Combine

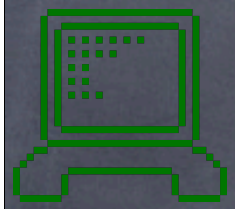
C

- For each component you'll be building:
  - Define functional requirements
  - Design the user experience
  - Specify the tool(s) that will be used
  - Document all the interfaces that will be used to integrate it with other components and extend it in the future
  - Establish a development timeline and budget
  - Document a test plan
- For the whole solution:
  - Determine how each system component relates
- Goal: An integration plan



Application Integration

- Solution "glue"
  - AppleScript / AppleEvents
  - PhonePro
  - Web Services / HTML
  - Databases
- User Interface Tools
  - FileMaker, etc.
  - FaceSpan
  - Realbasic
  - AppleScript Studio



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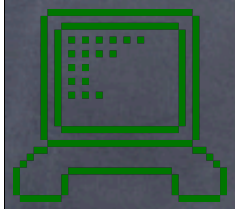
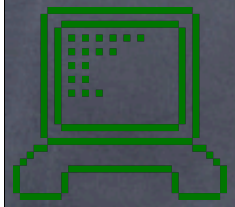


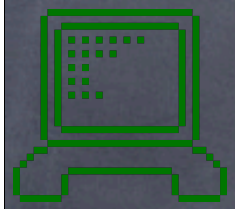
Deploy

D

- Establish an asset management strategy
  - Asset labeling scheme
  - Asset database
- Figure out what goes where
  - Which machine will run each piece of software?
  - Where will each component be physically placed?
  - Where will cables start/end/run?
- User and administrator training requirements
- Goal: Complete system blueprint and rollout plan with timeline and resource requirements

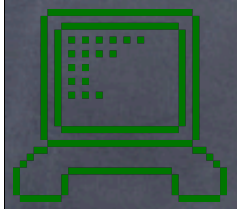


Next Steps



VoIP is a Catalyst

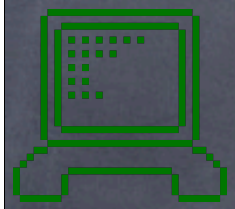
- VoIP should...
  - bring the benefits of computer telephony to the switching fabric
  - componentize the telephone system
  - eliminate dependence on a single vendor
- Customer motivation is for telephone systems...
  - that are open and modular
  - present no barriers to computer telephony applications
- Applications are the key but they're independent of the switching fabric



Mac OS X Products

- First generation is here!
- Each delivers a great set of features
- Next challenge:
  - Interoperability

Solution Components



Telephony Aware Applications

Proprietary Interface

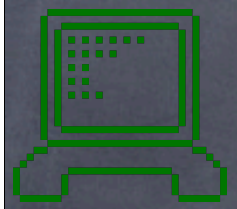
Screen Based Telephone Application

Programmed Telephony Application

Proprietary

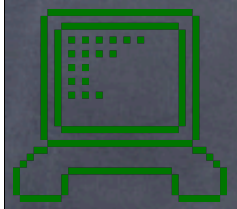
Proprietary

Telephony Devices and Links



Macintosh Telephony Alliance

- Alliance of leading Macintosh developers
- Defining and adopting interoperability specifications for Mac OS X
- Utilize industry standards from:
  - ECTF
  - IETF
  - ITU



Mac OS X Telephony Architecture

HTML

Telephony Aware Applications

DialURL

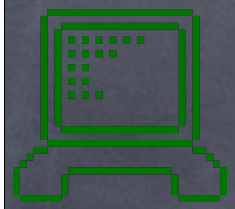
Telephony Apple Events

Screen Based Telephone Application

Programmed Telephony Application

CT Services Framework

Telephony Devices and Links



ABCDs of CT Solutions

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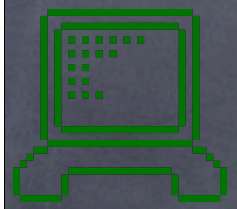
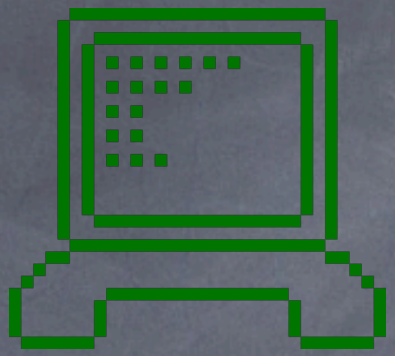
- **D** Deploy



Resources

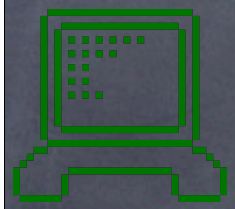
- Macintosh Telephony Information:
  - www.MacPhoneHome.com
- Macintosh Telephony Alliance:
  - www.MacTelephony.org
- Products:
  - www.ilink.de
  - www.megaphoneco.com
  - www.ovolab.com
  - www.parliant.com
  - www.xten.com
- Slides:
  - www.ctexpert.com/macworldsf06



Q&A

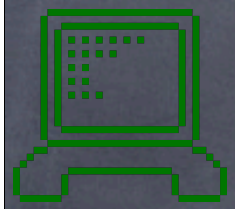
Michael Bayer
Computer Telephony Solutions

For more information contact: mbayer@CTExpert.com



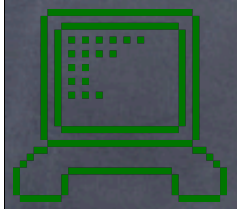
Public Relations Manager

- Single Person Business
- Works from Home Office
- Has a single phone line
- Supports numerous clients
- Work revolves around press contacts



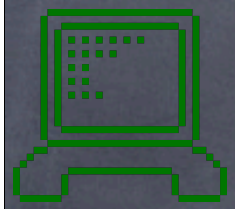
Attorney

- All revenue is generated through a fee-for-time basis so Time and Billing system is mission critical
- A significant portion of time is spent on telephone calls



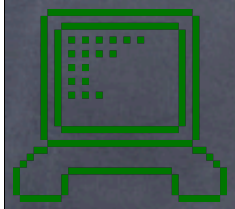
Real Estate

- Telephony-based housing information
- Collection of marketing data to track which ads/ signs are working best
- Fax back
- Interested customers can leave voicemail
- Individual agents add, update, and remove listings from any telephone



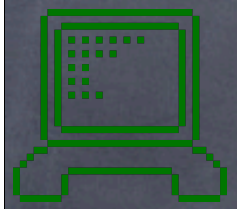
Car Dealership

- Quarterly sales promotions generate many phone calls (despite detailed advertising)
- Call volume takes away from staff time
- Interactive Voice Response (IVR) system eliminates the need to have staff answer repetitive questions



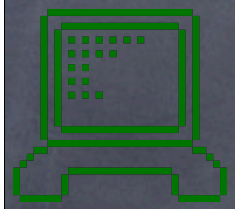
Free-Lance Photographer

- Call screening
- Follow-me
- Find-me
- Call-back
- Cell-phone helper
- Customized outbound messages
- Fax Back



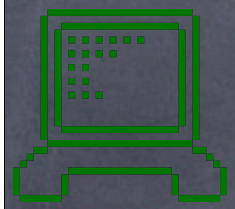
E-Commerce

- Self Service via:
  - Dynamic web site
  - Integrated phone-based customer support



Contact Center

- Sales team to increase sales through up-sell and drive follow-up sales
- Many customers need to talk to a live person
- Business lost when customers want more information than is available on the website
- Little problems can lead to significant customer dissatisfaction without personal attention



Contact Center: Features

- Distribution of calls to staff members
  - Callers routed to agent last talked to if available
  - Priority customers routed to top sales agents
  - After hours, voicemail and IVR is used
- Customer Relationship Management (CRM) functionality
  - Customer information is presented to agents even before call is answered
  - Screen-pop pulls from customer, sales, and support databases