

# Voice over IP and IP Telephony

*Application solution overview*



# Objectives



- **Understand VoIP & IP Telephony technology**
- **Understand VoIP & IP Telephony network layout and environment**
- **Understand VoIP & IP Telephony challenges & APC Solutions**

# Agenda



- **Architecture overview**
- **Key customer challenges**
- **APC solutions**
- **Customer testimonials**
- **Design tools / process**
- **Summary**
- **Review questions**
- **Reference materials**



# Architecture Overview

Environment   Network Layers

Desktop

IP Phones

IDF /  
Wiring  
Closet

Access Layer

Distribution Layer

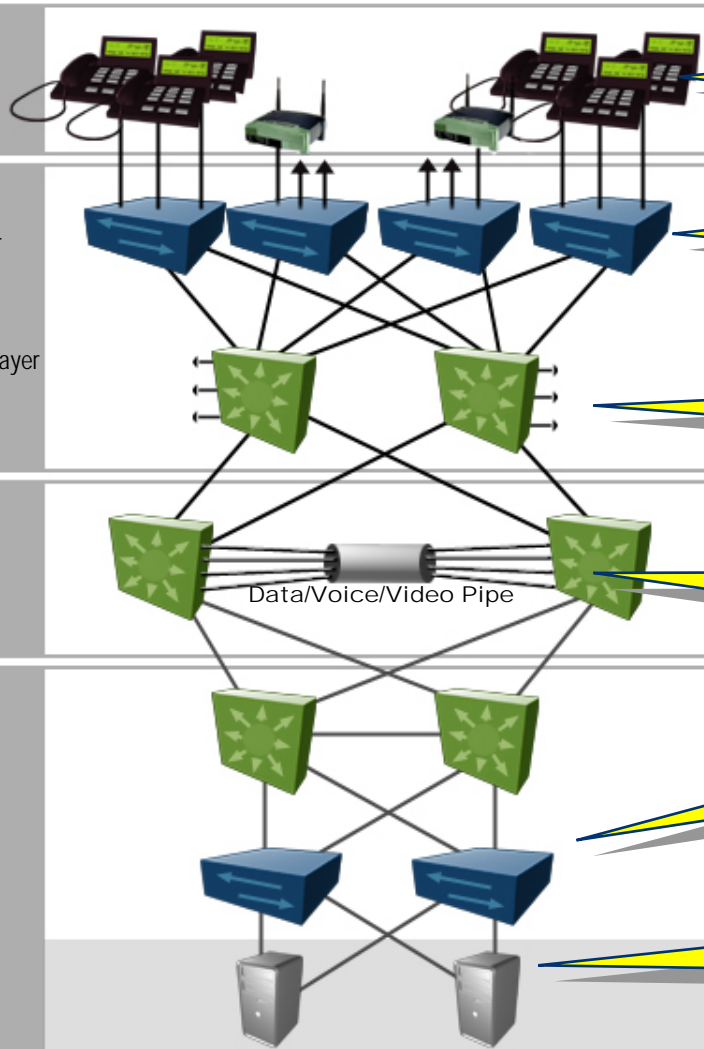
Main  
Distribution  
Facility

Core Switch

Data Center

Server Farm

Call Servers



**IP Phones, laptops, wireless hubs**

**Switches with inline power**

**Edge routers/switches**

**Large backbone routers/switches**

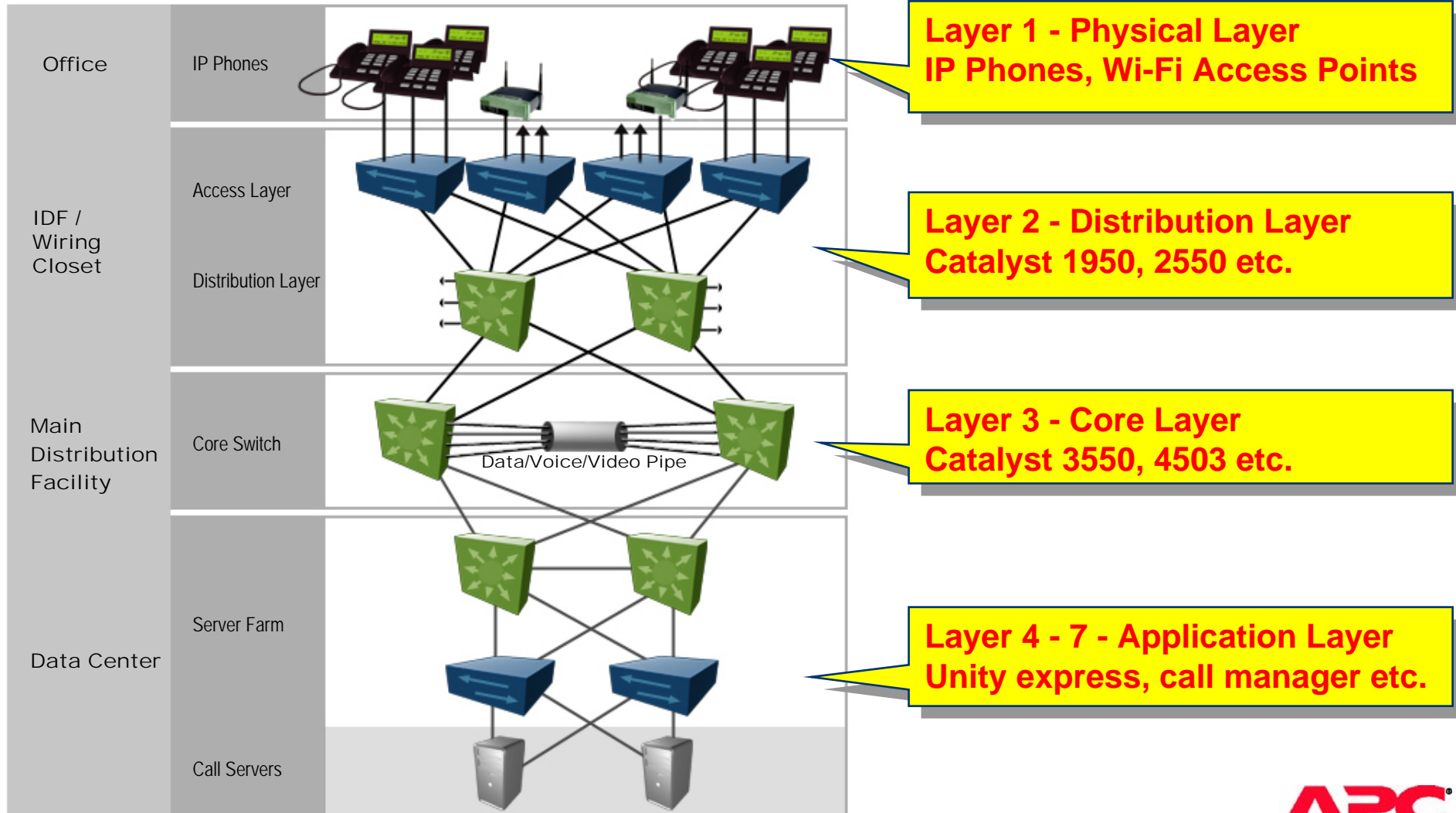
**Switches with inline power**

**Application servers e.g. call managers, unified messaging**



# Architecture Overview - Layers of Network

Environment    Network Layers



# Key Challenges

## Desktop

Phone availability is affected by power problems if the phone is powered locally.

## IDF

Heat dissipation, physical space, high availability, and electrical wiring need to be quickly upgraded.

- Switches power the phones (15W per phone)
- Loads increase from 1000W max to >4000W
- Switches and UPS(s) require much more space
- Network must provide same availability levels as legacy telephony

## MDF

Physical infrastructure (rack, power, and cooling) needs a quick upgrade.

- UPS loads are much larger than the existing UPS can handle.
- The current UPS/Cooling solutions are not designed to provide the new availability requirements.
- Entire infrastructure may need to be replaced due to space problems

## Data Center

Racks must be quickly integrated into the data center infrastructure for new switches and servers.



# APC Solutions

# Key Considerations for Solutions

## Power

- Size the total UPS load not just the switch and beware of how the phones are powered
- Provide ample run time across the network- 1 to 2 hours is a typical requirement for phones
- Determine needed availability requirements (N+1 Redundant, 2N redundant, etc.)

## Racks

- Select open racks for switches with side-to-side air flow
- Choose racks that will support the larger UPS and battery frames
- Ensure availability of enough receptacles and that PDU strips won't be overloaded

## Cooling

- Ensure solution allows monitoring of temperature in the room
- Identify increased ventilation/cooling needs and supplement as needed

## Management

- Design a complete management strategy for entire infrastructure rather than individual equipment
- Ensure a sound strategy for networks with many remote sites

## Services

- Consider on-site service for locations with little or no support staff; Needs Assessment surveys and Expert Installation



# Challenge: Desktop Environment



## Environment

- Technology user's desk in office or cubicle
- Shelf

## Technology

- Phones, Laptops, Wireless hubs, etc.
  - Some plug into wall at user's desk
  - Newer Devices draw (48VDC) Power over Ethernet (PoE) from the IDF switch or Midspan power device fed by the switch
- **Typical Power Draw**
  - 6-7 watts
  - Max 15W-new Standard IEEE802.3af



## Challenge

- Phone availability is affected by power problems if the phone is powered locally.

# APC Solution for Desktop



## Power

- Plug all office equipment into one UPS
  - IP Phone
  - WiFi Hub/Router
  - Web Security Camera
  - Printers/Fax/Peripherals
- Protect from surge traveling over phone/cable lines
- Prevent data loss and file corruption

## Management

- PowerChute® Personal Edition (easy to use, safe system shutdown with sophisticated power management functions)

# APC Solution for Desktop Environment

## Back-UPS ES and HS 350VA – 725VA

### Protection

- Battery power prevents data loss and file corruption
- Offers protection from surges traveling over phone lines
- File-saving, automatic shutdown software protects files even when the user is not around

### Convenience

- Use transformer block plugs without blocking other outlets
- Automatic diagnostic testing provides proactive notification of the need to replace the battery



***The most popular UPS in the world!***

**APC**  
Legendary Reliability™



# Challenge: IDF Environment

## Environment

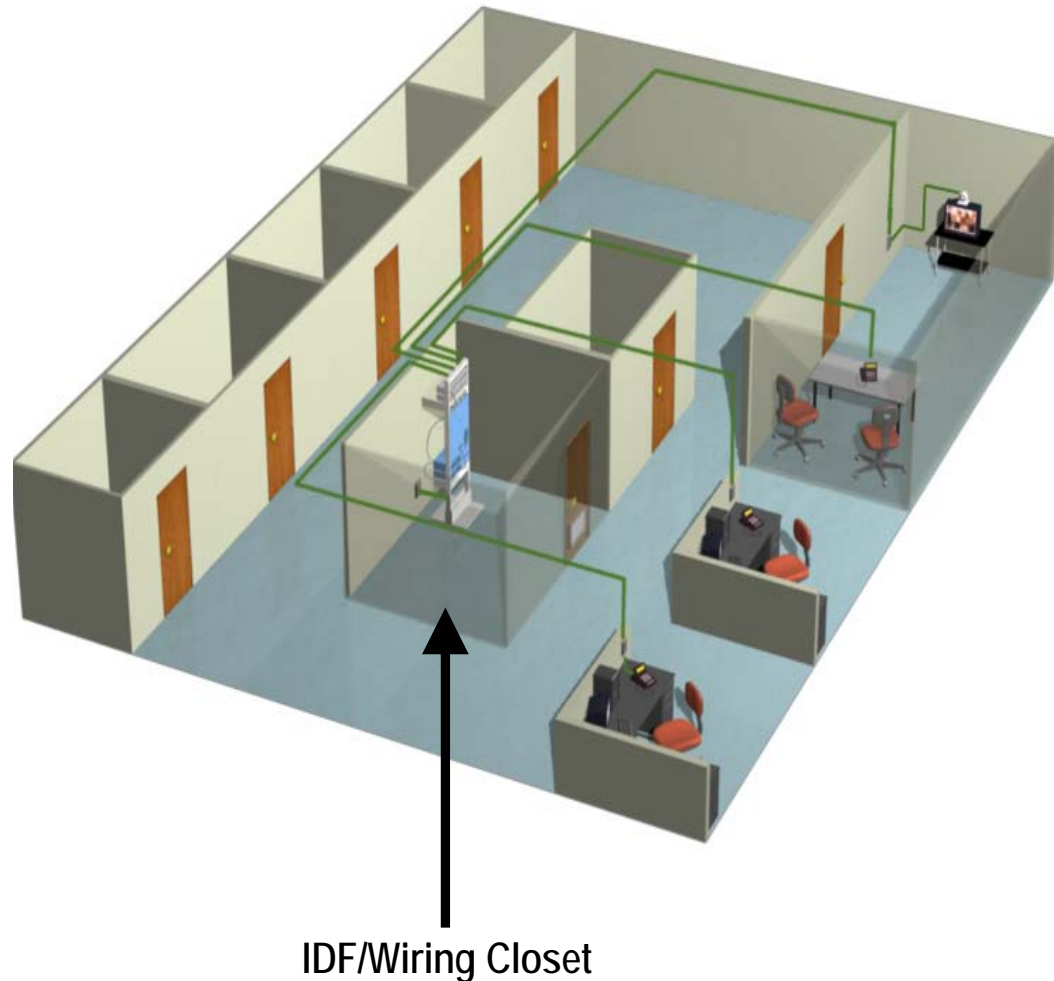
- Close to technology user
- Small room or closet, shared space like a store room, locked rack enclosure
- 120V available; 208V requires rework
- comfort cooled at best
- 2-post racks

## Technology

- Switches, routers, patch panels
- Typical Power Draw:
  - Small office-500W
  - Large office-up to 4000W

## Challenge

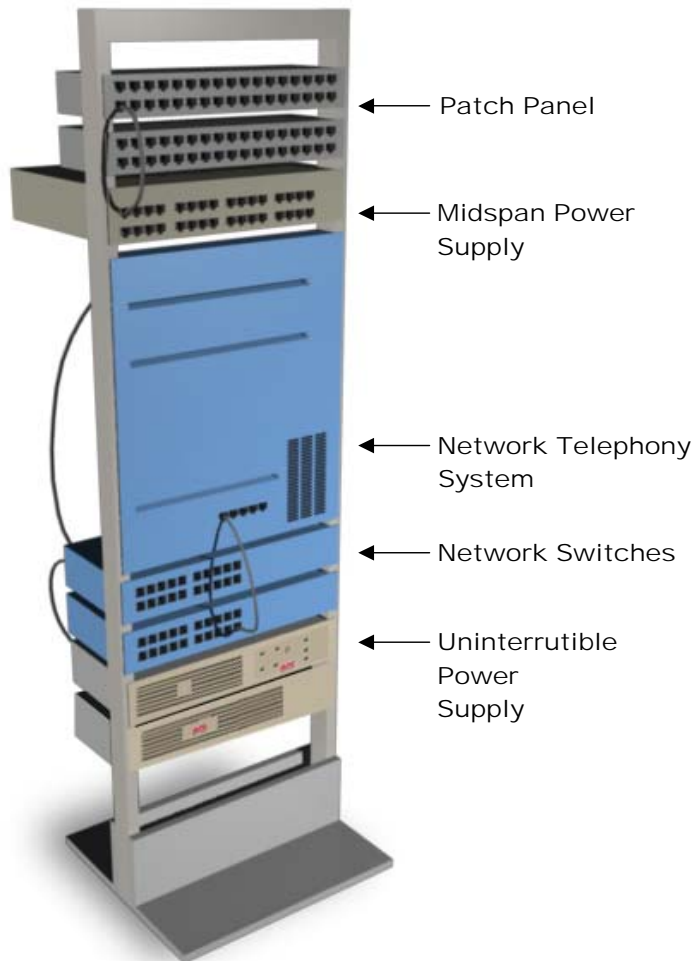
- Heat dissipation, physical space, high availability, and electrical wiring need to be quickly upgraded.



IDF/Wiring Closet



# APC Solution for Typical IDF



## Power

- **Smart-UPS® XL or Smart-UPS RT:** For SMB IDF having stackable switches
- **Symmetra® RM or Symmetra LX:** For enterprise IDF having chassis based switched

## Racks/Power Distribution Units (PDUs)

- **2-post Open Rack:** For Smart-UPS XL or Smart-UPS RT
- **4-post Open Rack:** For Symmetra RM or Symmetra LX
- **PDUs:** Users can plug the electric loads directly into the UPS (extra Rack PDUs can be added as needed)

## Cooling

- **NetworkAir™ CM or PA:** For supplemental cooling

## Management

- **Environmental Monitoring Unit/Card**
- **UPS Network Management Cards:** Helps monitor and control UPSs connected to servers and other networking equipment
- **InfraStruXure™ Manager Appliance:** Browser-accessible, user-friendly tool to easily manage your entire APC network critical physical infrastructure (NCPI)

## Service

- **Needs Assessment and Power Audits:** For VoIP network planning (Should coincide with Network Assessment Service)
- **On-Site Service:** For non-staffed locations
- **Remote UPS Monitoring**



# APC Solution Applied for IDF



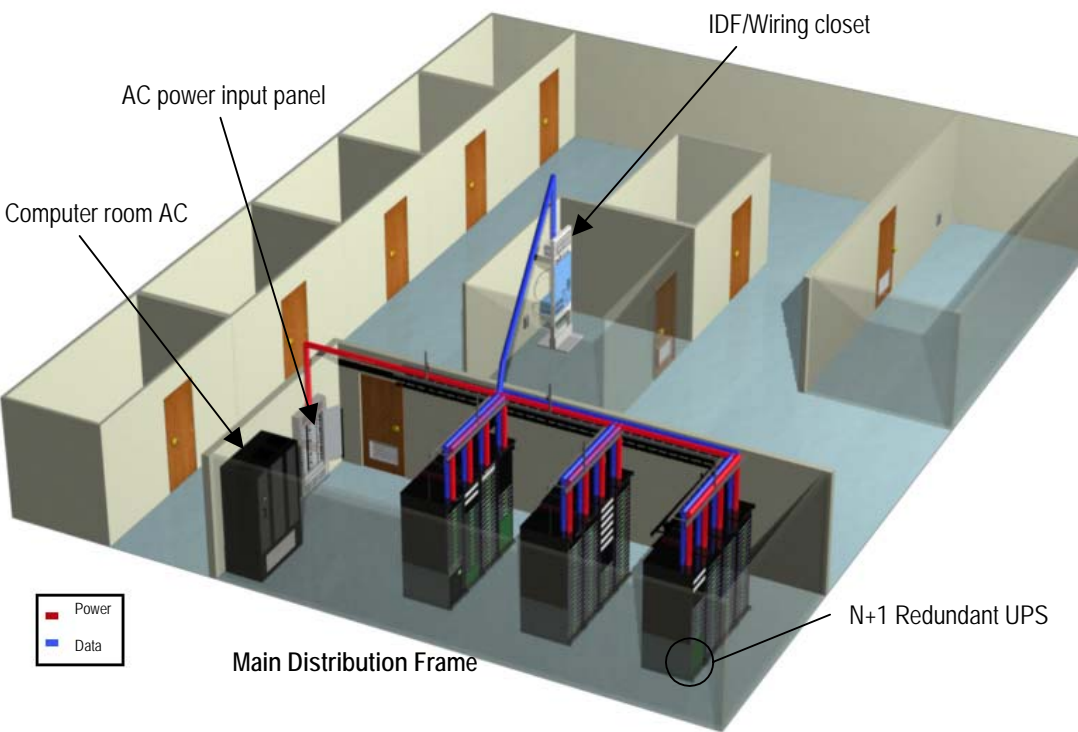
## InfraStruXure Solution for Closet







# Challenge: MDF Environment



## Environment

- Computer room typical
- Sometimes small shared space
- Cement floor, tiled ceiling
- Cooled with building cooling system, sometimes precision cooling
- Mixture of open racks and enclosures

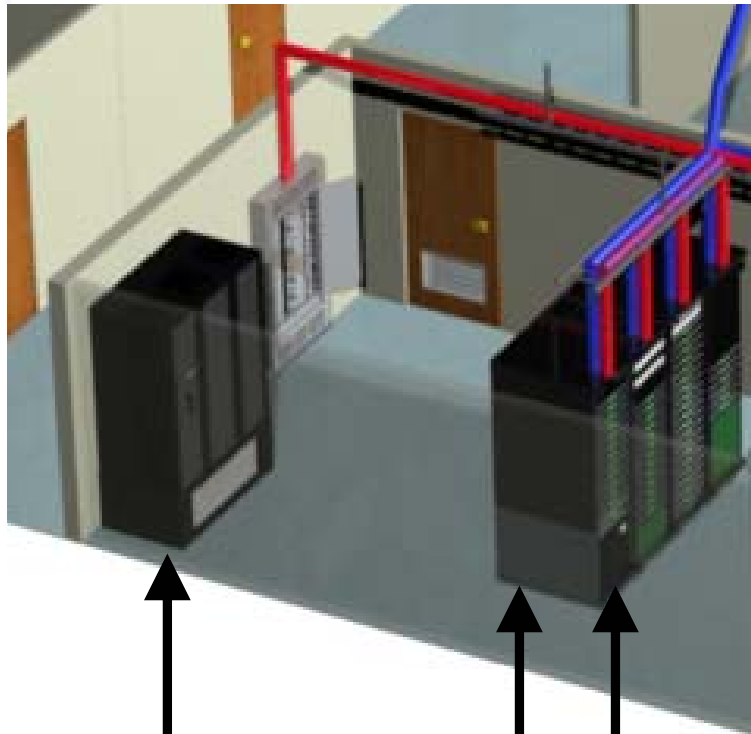
## Technology

- Switches, routers, application servers
- Typical Power Draw
- 4kW to 40kW
- Single or three phase

## Challenge

- Physical infrastructure (rack, power, and cooling) needs a quick upgrade.

# APC Solution for Typical MDF



NetworkAir FM

Symmetra RM

Netshelter VX

## Power

- Smart-UPS XL or Smart-UPS RT: For 1-2 racks
- Symmetra RM or Symmetra LX: For 2-10 racks
- Symmetra PX or Smart-UPS VT: For >10 racks

## Racks/PDUs

- 2-post Open Racks: For switches with side-to-side air flow
- NetShelter Enclosures: For servers and switches with front-to-back air flow
- Basic PDU: For small MDF
- Metered or switched PDU: For larger mission-critical installations

## Cooling

- NetworkAir CM, PA or FM: For additional cooling

## Management

- Environmental Monitoring Unit/Card
- UPS Network Management Card
- InfraStruXure Manager Appliances

## Service

- Needs Assessment and Power Audit
- Onsite Service with Preventative Maintenance
- Remote UPS Monitoring





# APC Solution Applied



## InfraStruXure Solution





# Challenge: Data Center

## Environment

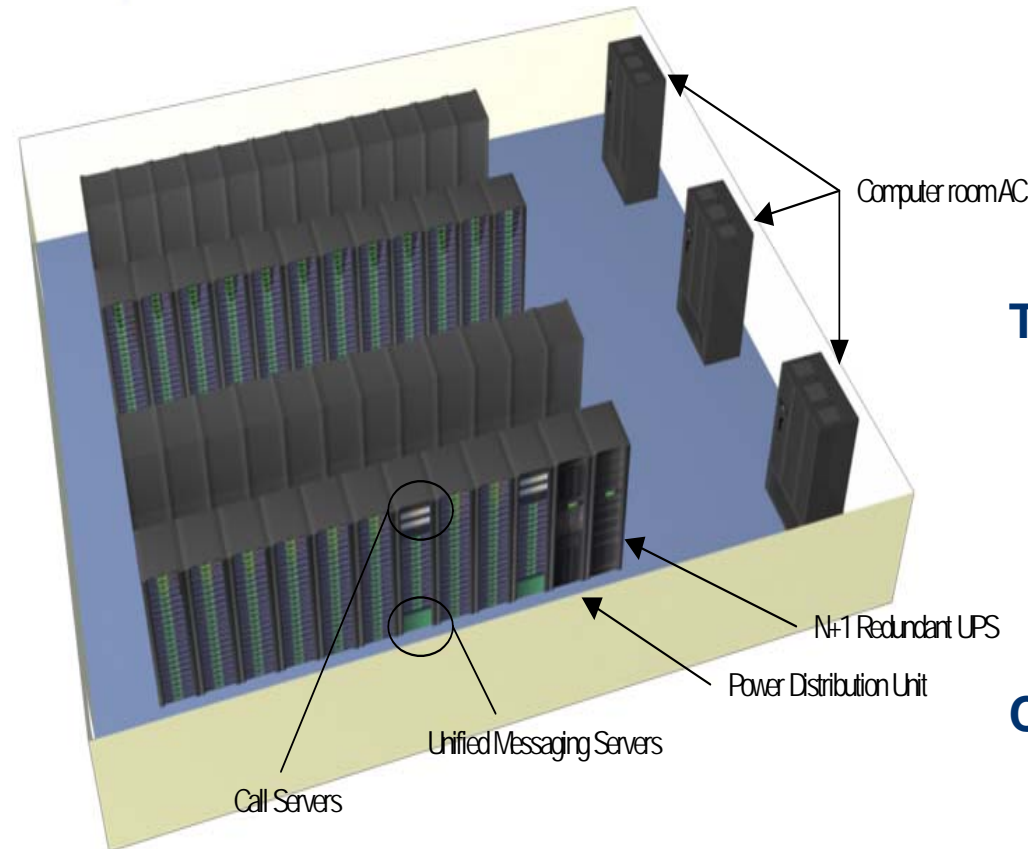
- Environmentally controlled room
- Enterprise and large midsize companies
- All power options readily available
- Four post rack enclosure for servers
- Open racks for switches/networking

## Technology

- Call servers, application servers, backbone switches
- Typical power draw
  - 10kW to several MW
  - Three phase UPS typically used

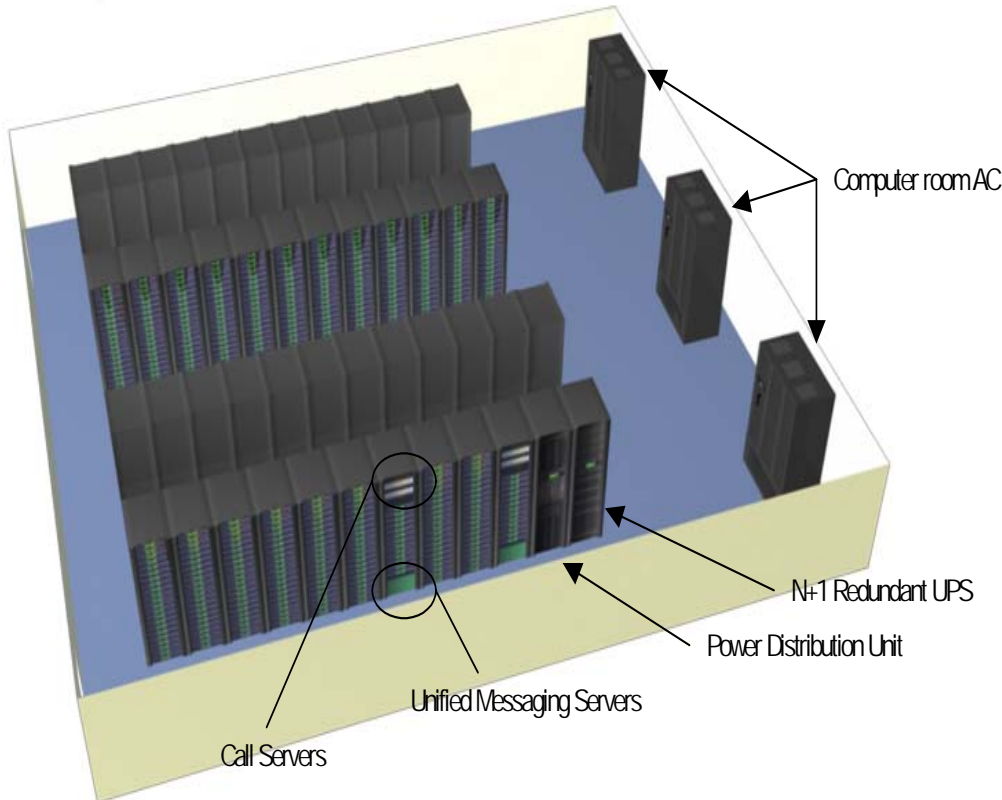
## Challenge

- Racks must be quickly integrated into the data center infrastructure for new switches and servers.





# APC Solutions for Data Center



## Power

- Symmetra PX or Smart-UPS VT

## Racks/PDUs

- NetShelter Enclosures: For servers
- 2-post Open Racks: For switches with side-to-side air flow
- Metered or switched PDU
- Rack ATS: For single or triple corded loads

## Cooling

- NetworkAir FM, IR, AFX and CW: Provides modular floor-mount precision air conditioning for environmentally-sensitive equipment areas (Air, water, glycol-cooled)

## Management

- Environmental Monitoring Unit/Card
- UPS Network Management Card
- InfraStruXure Manager Appliances

## Service

- Needs Assessment and Power Audit
- Installation Services
- Network Integration
- Onsite Service with Preventative Maintenance
- Remote UPS Monitoring



# APC Solution Applied



## InfraStruXure Solution for Data Centers



# Testimonials



"Availability is even more critical in our new environment, because the phones are now run over the network," says Mr. Shah. "The bottom line was that integrating InfraStruXure directly with our high-availability network components made a lot of sense."

*Kamal Shah*

*Vice President and Group IT Director*

*Tremont Advisers, Inc, .. Subsidiary of Oppenheimer Funds Inc.*



"The APC Symmetra® RM backing up our Cisco network installation at the Summit of the Americas helped keep the lines of communication open."

*Trevor Rodriguez*

*Program Manager*

*Cisco Systems*

# Related Solutions



## Patch Panels & Cables

High quality, manufactured to industry standards to keep your network running



## Netshelter Accessories

Cable & thermal management accessories, shelving, mounting hardware, keyboard drawers, stabilization and grounding kits etc.

## Surge Protection

To safe guard your sensitive electronic equipments from everyday power surges and lightning strikes.



## InfraStruXure Solutions

Fully integrated, pre-engineered rack based power, cooling and environmental management that are scalable.





# Design Tools

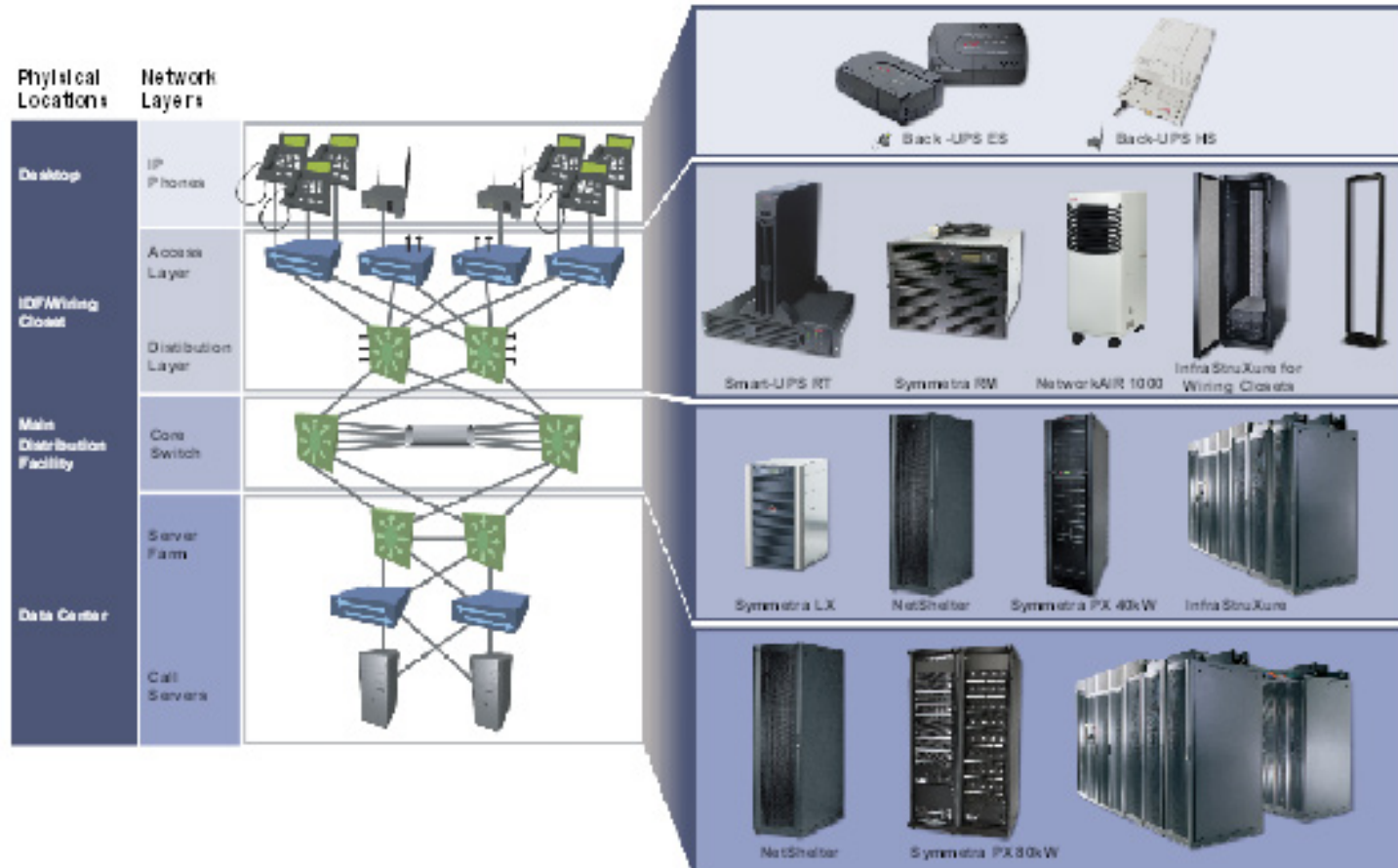
- **WWW.APC.COM**

- APC InfraStruXure Estimator/Configurator (with IT Channel Partner)
- APC UPS Selector
- APC Rack Configurator





# VoIP Architecture/Solution Overview



**Higher Availability and Most Comprehensive End-to-End Solutions**





# FAQs

- **When do I need a UPS for an IP Phone?**
- **What new challenges arise in the IDF when you implement VoIP?**
- **What new challenges arise in the MDF when you implement VoIP?**
- **My call processing and unified messaging servers are being placed in a data center that has UPS protection. When do I need a separate UPS for them?**
- **Any other questions you have?**

# Reference Materials

List of related articles and any references this information came from

- **APC White Paper # 69**  
Power and Cooling for VoIP and IP Telephony Applications
- **APC Application Note # 50**  
APC Power Protection for Cisco VoIP and IP Telephony Solutions
- **APC Application Note # 51**  
APC Solutions for Nortel's Business Communications Manager
- **APC VoIP Brochure Part # DSN-1017**