Building a Hosted, Multi-Tenent Contact Center Environment for Thousands of Agents

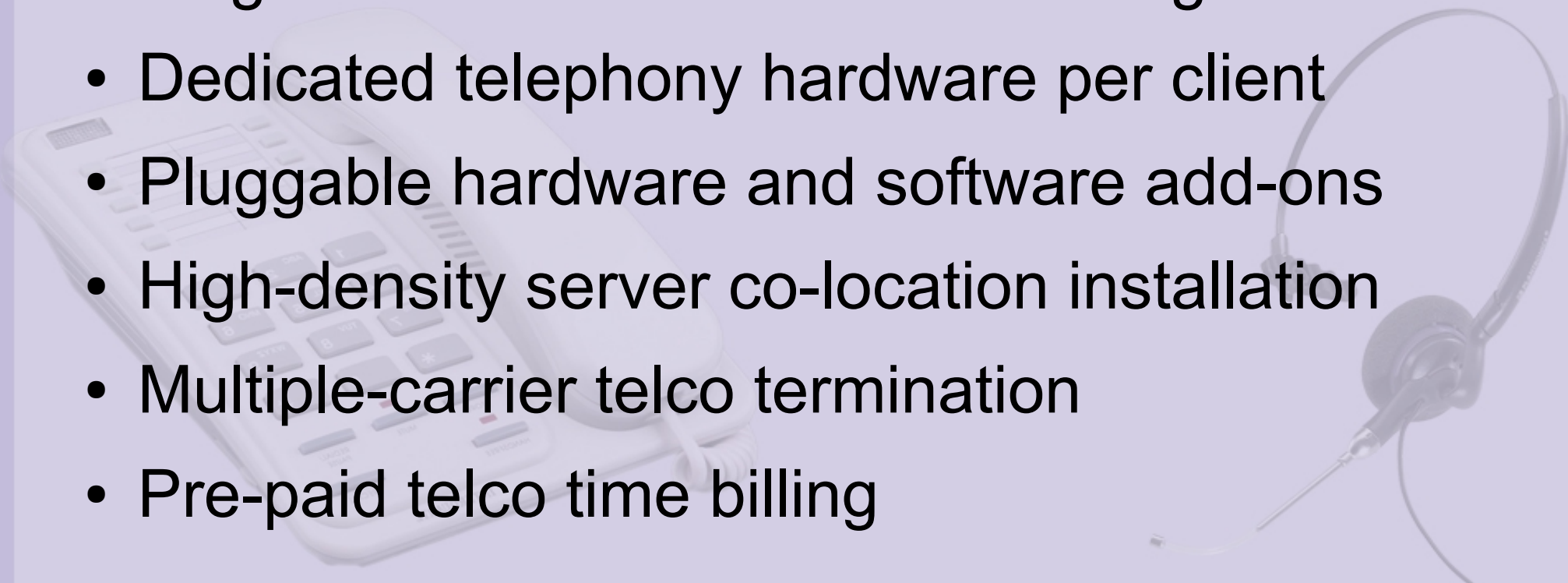Presented by

Matt Florell
President - ViciDial Group

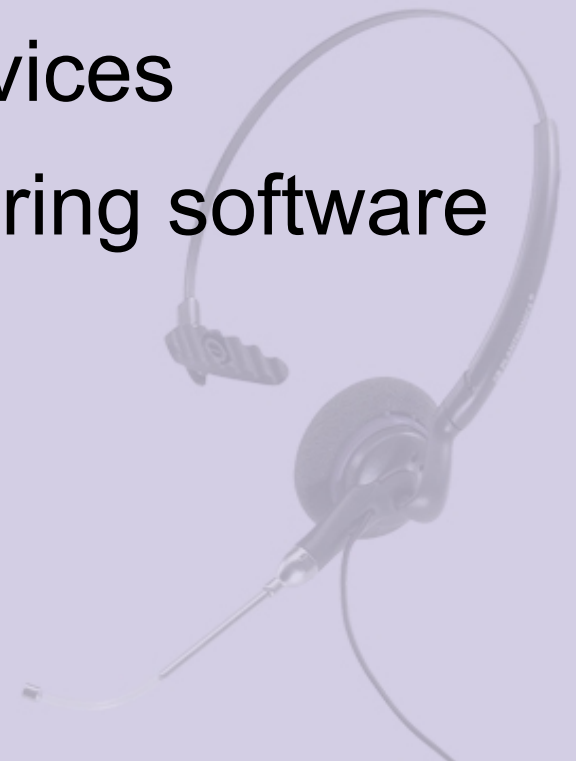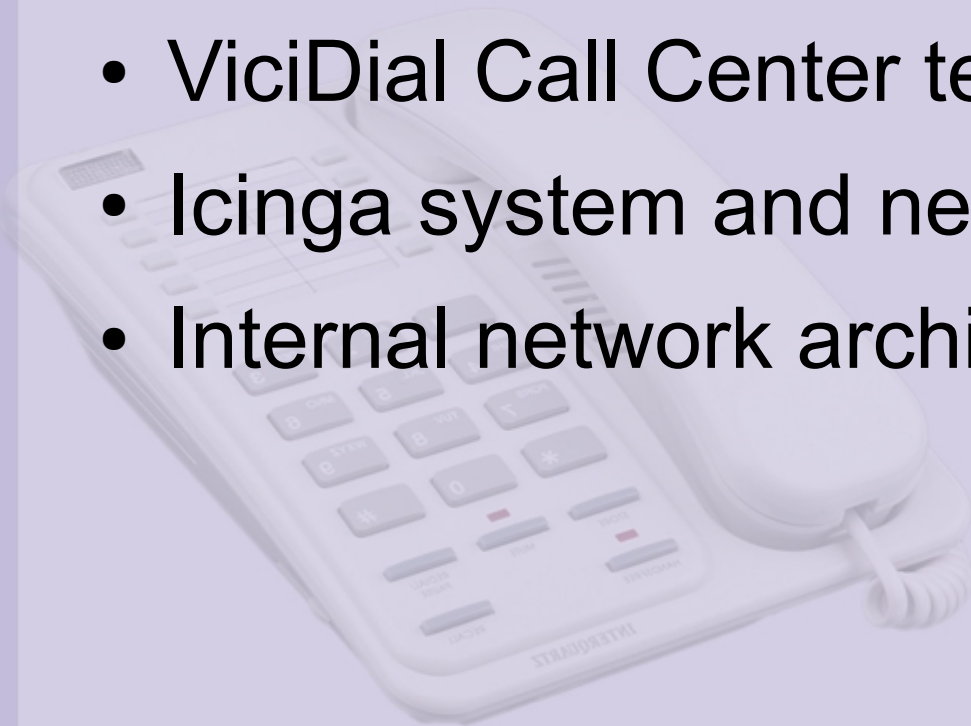Astricon 2013 * Atlanta, GA, USA
October 10, 2013

Project Requirements

- Scalable architecture for inbound, outbound and blended call centers

- Redundant and fail-over components

- Target call centers with 5 or more agents

- Dedicated telephony hardware per client

- Pluggable hardware and software add-ons

- High-density server co-location installation

- Multiple-carrier telco termination

- Pre-paid telco time billing

Scalable/Redundant Architecture

- RAID-1 or RAID-10 everywhere(except archive[RAID-6])
- Telco termination services
- Database services
- Web services
- ViciDial Call Center telephony services
- Icinga system and network monitoring software
- Internal network architecture

RAID-1 or RAID-10 Everywhere

- RAID-1 Redundancy if a drive fails on telephony server or web server

- RAID-10 for redundancy and speed on database servers

- RAID-6 for archive servers only, too slow for all other purposes (Never RAID5 or 6 your database server!!!)

- Use of SSD drives for database servers together with LSI Logic MegaRAID cards greatly improves database performance

LSI ™

Telco Termination Services

- Multiple outbound carriers

- Tier 3 data centers provide multiple data carrier paths to telco carriers

- Multiple OpenSIPS servers operating on independent local databases with outbound dialing fail-over to the other OpenSIPS servers

- Each OpenSIPS server can route thousands of concurrent calls per minute

Database Services

- MySQL(MariaDB) Master/Slave replication for fail-over in case of total hardware failure

- Incremental backups conducted from the slave servers, to not interrupt operations

- Large amounts of RAM on database servers to allow for more in-memory queries

Web Services

- Apache load balancing with apache mod_proxy module

- Vicidial's web interfaces do not require session stickiness for agent or admin web sessions, making load balancing simpler and faster

Vicidial Call Center

- Each client has their own instance of Vicidial

- Multi-server capable

- Inbound and outbound call load balancing

- Agent phone load balancing and fail-over across servers

- Asterisk 1.4 and Asterisk 1.8 based

Icinga Monitoring

- Monitors:
  - Server accessibility
  - Network integrity
  - System load
  - Asterisk live channels
  - Web connectivity
  - MySQL(MariaDB) connectivity and slave replication integrity

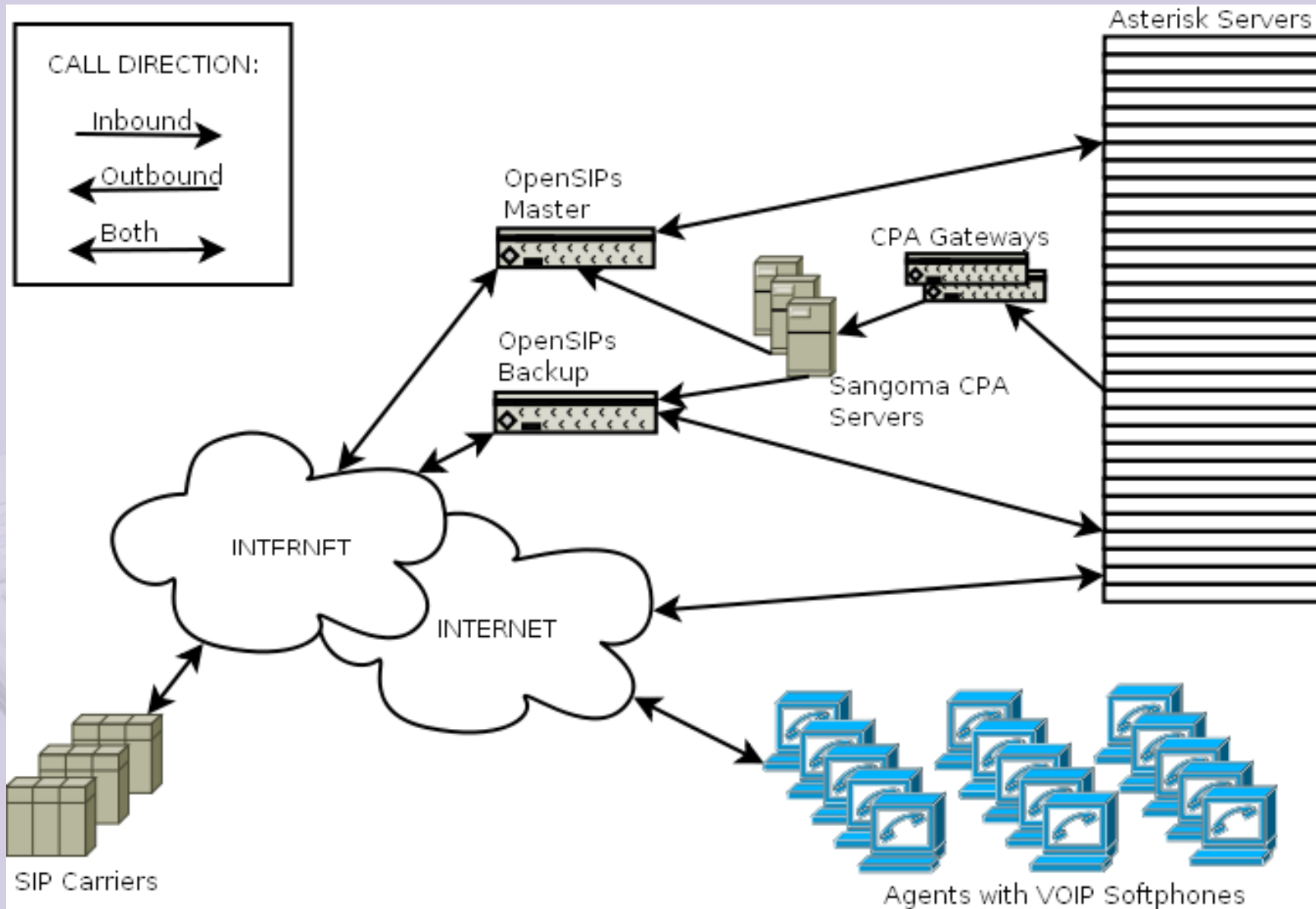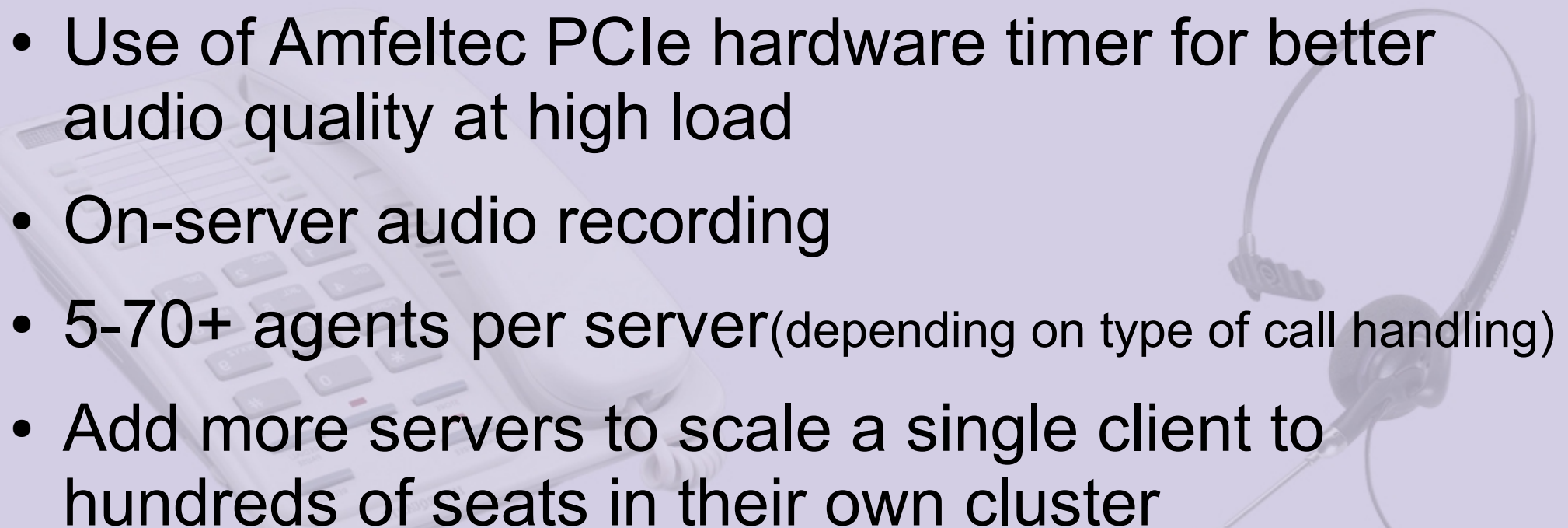- Sends warnings through email and control panel

ICINGA

Internal Network

- All internal network infrastructure is using HP switching equipment

- Dual 10GB connections to Tier 3 datacenter networks

- Dual bridged connections to second level data network switches for redundancy

ProCurve
Networking by HP

Call Path Diagram:

Dedicated Telephony Hardware

- A problem with many hosted multi-tenant call center services is control of resource allocation

- Poor audio quality and reduced total capacity of hardware if you use Virtual Machines

- Use of Amfeltec PCIe hardware timer for better audio quality at high load

- On-server audio recording

- 5-70+ agents per server(depending on type of call handling)

- Add more servers to scale a single client to hundreds of seats in their own cluster

Small 1U Telephony Servers

- Single quad-core Intel CPU with 8GB RAM

- Software RAID-1 for redundancy of drives

- 1U form factor, 10 inches deep

- All ports in front except for power plug

- We add extra fans for better ventilation

- Very low power usage

Hardware Add-ons

- Amfeltec PCIe timer module
  - For hardware timer to give better audio quality at higher loads

- Sangoma D100 Transcoding cards
  - For clients or carriers wanting G729 codec use
  - Includes licenses
  - Multiple channel capacities

Proprietary Software Add-ons

- Cepstral Text-to-Speech
- Sangoma Call Progress Analysis (Lyra)
- QueueMetrics Statistical Analysis
- DNC.com cellphone filtering batch files
- Zoiper webphone

Cepstral Text-to-Speech

- Broadcast outbound campaigns
  - Personalized message
  - Order status changes

- Inbound dynamic IVRs
  - Payment processing
  - Order status
  - Account balance

POWERED BY
CEPSTRAL
WE BUILD VOICES

Sangoma Lyra (CPA)

- Pre-Answer signal analysis
  - SIT tones
  - Disconnected numbers

- Answering Machine Detection
  - Very fast detection
  - End of message detection

LYRA
AMD for Asterisk®

QueueMetrics Statistics

- Visually oriented call stats package

- Uses a different method of logging than Vicidial

- Separated system with no access to Vicidial administration

QueueMetrics
call center monitor

•DNC.com Cellphone Filtering

- Recently added option that works with DNC.com prefix and number portability batch files

- Updated daily

- Allows for compliance with TCPA FCC regulations for not auto-dialing cellphones in the USA without explicit permission
(Going into effect October 16, 2013)

CONTACT CENTER
COMPLIANCE
W W W . D N C . C O M

Zoiper Webphone

- No configuration needed on agent workstation

- Soft-phone that can be embedded in the ViciDial screen

- SIP or IAX protocol

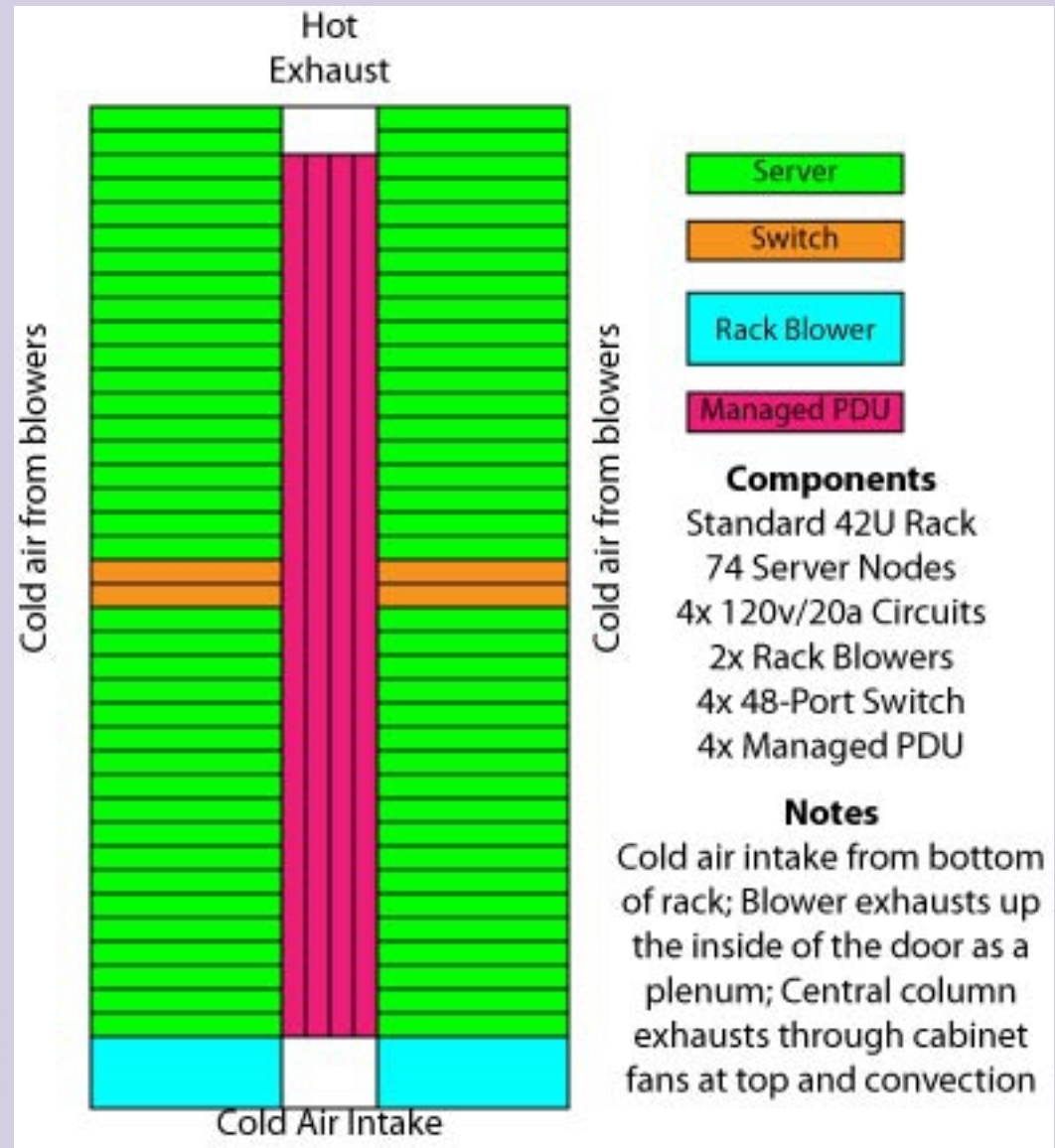- Windows agent only

Agent Screen with Embedded Phone

High-Density Co-Location

- Tier 3 Co-location facilities in Tampa, Florida and Northern Virginia

- Double-racked small 1U servers allows for 74+ servers per rack
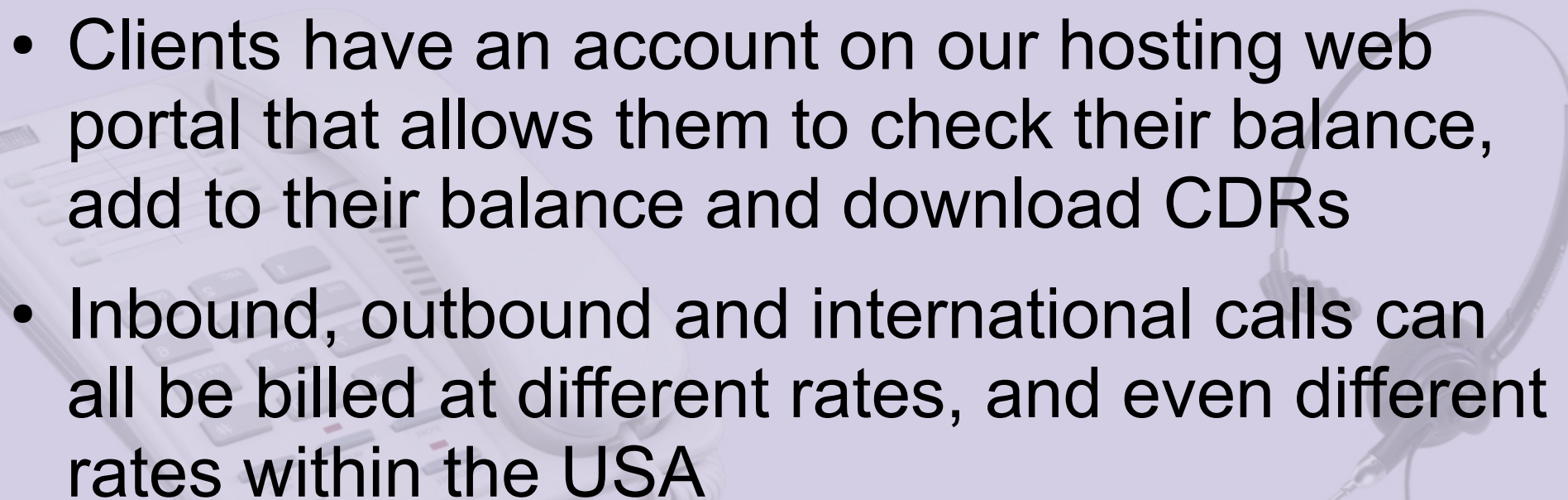
High-Density Server Installation

- Similar to how many large data centers like Google are set up on a per-rack basis

- Center hot-air-column exhausting out the top

Hot Exhaust

Cold air from blowers

Cold air from blowers

Server
Switch
Rack Blower
Managed PDU

Components
Standard 42U Rack
74 Server Nodes
4x 120v/20a Circuits
2x Rack Blowers
4x 48-Port Switch
4x Managed PDU

Notes
Cold air intake from bottom of rack; Blower exhausts up the inside of the door as a plenum; Central column exhausts through cabinet fans at top and convection

Cold Air Intake

Multiple Carrier Telco Termination

- Several outbound carriers are used for placing outbound calls

  (most carriers do not like high volume or rapid outbound dialing)

- Calls can fail on one carrier then retry on another carrier depending on the return code

- For inbound there are not too many options for multi-carrier. Some clients have inbound numbers on more than one carrier, or use providers that distribute calls to multiple inbound numbers

- OpenSIPS is used for all telco termination routing to and from the ViciDial servers

Pre-Paid Telco Time Billing

- All customers' inbound and outbound calls can be selectively allowed or denied traffic

- Logging of call length is done at the OpenSIPS layer for the best accuracy

- Clients have an account on our hosting web portal that allows them to check their balance, add to their balance and download CDRs

- Inbound, outbound and international calls can all be billed at different rates, and even different rates within the USA

Thank you!

For more information, go to:

http://www.vicidial.org