

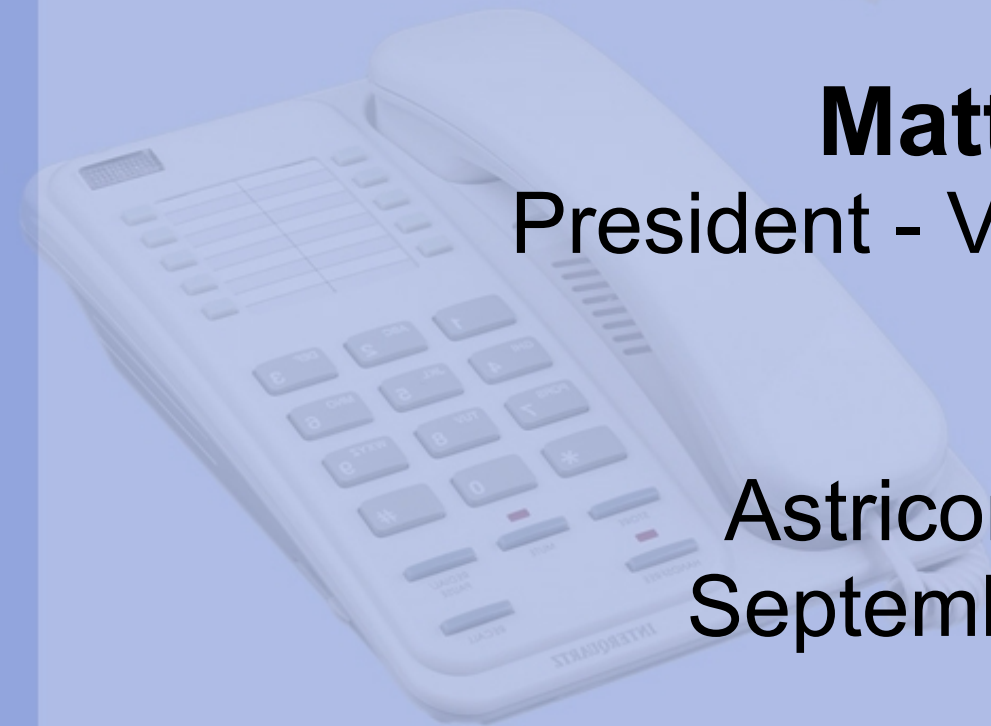
Case Study: Building a Hosted Call Center

Presented by

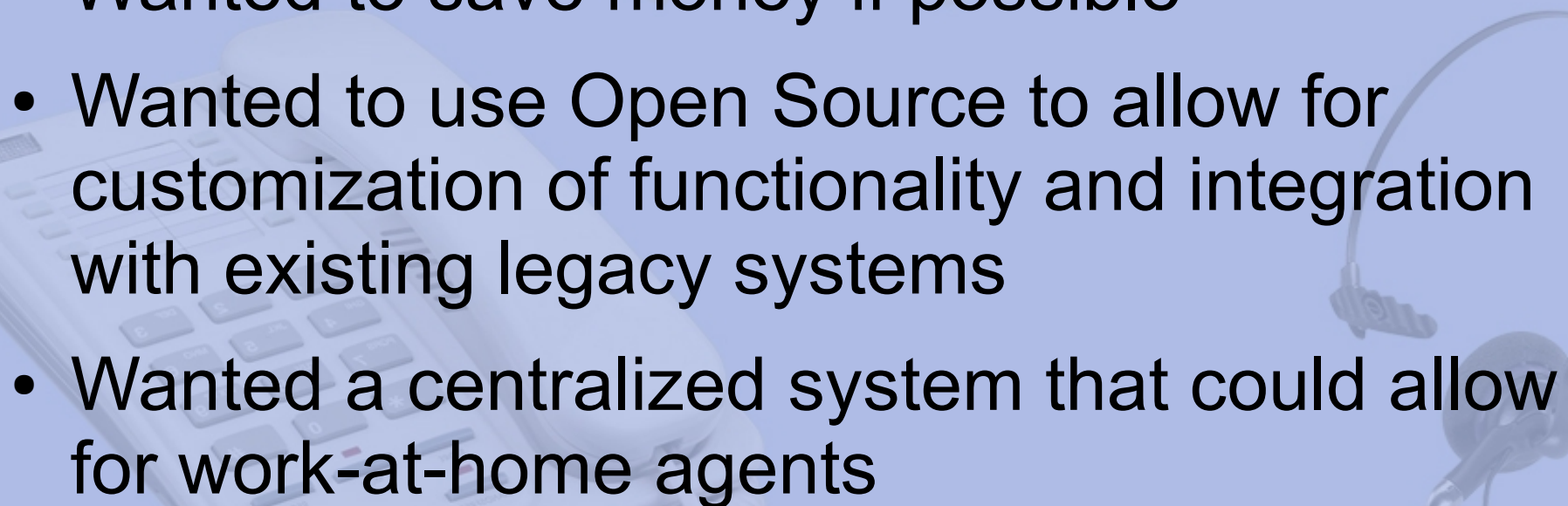
Matt Florell

President - VICIDIAL Group

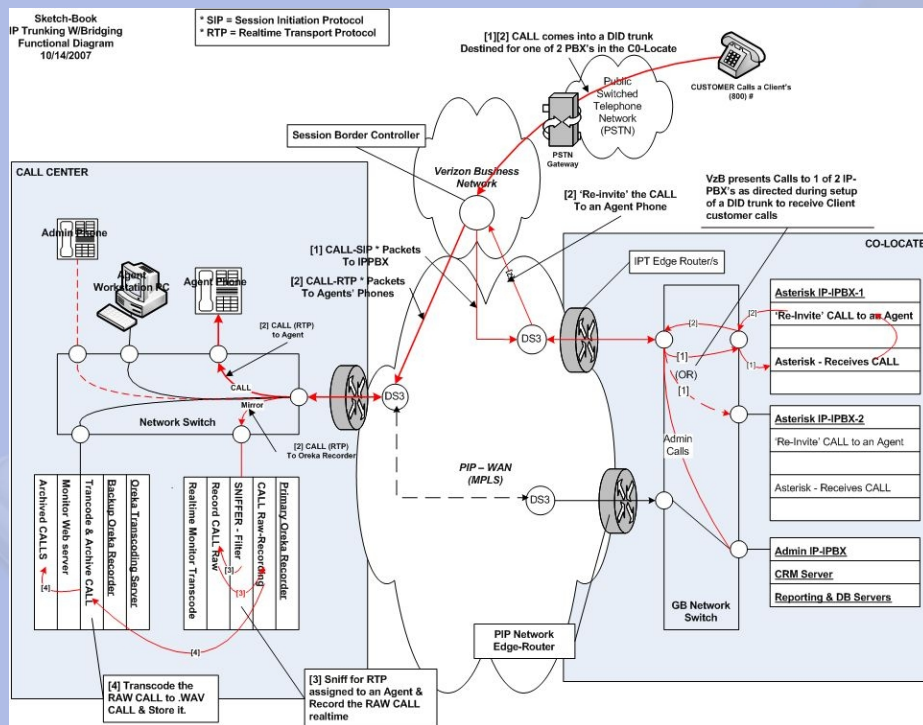
Astricon * Phoenix
September 25, 2008



Intermedi@ Marketing Solutions

- Wanted to move to a centralized call center solution at a carrier co-location facility
 - Wanted to avoid vendor-lock-in
 - Wanted to save money if possible
 - Wanted to use Open Source to allow for customization of functionality and integration with existing legacy systems
 - Wanted a centralized system that could allow for work-at-home agents
- 

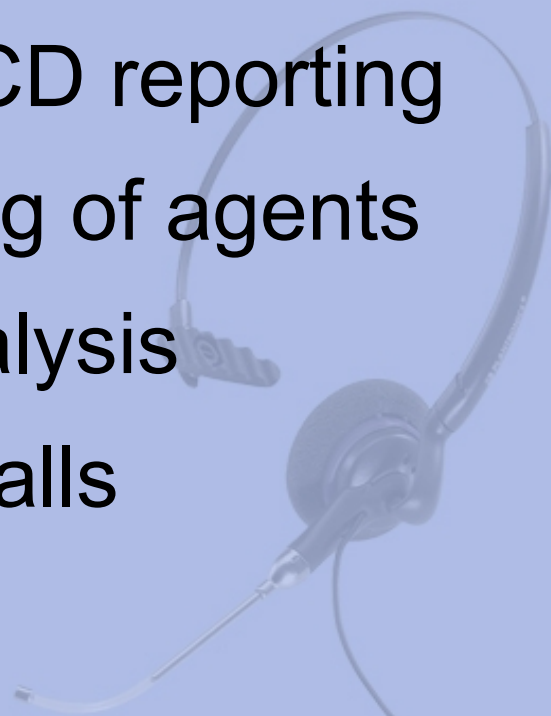
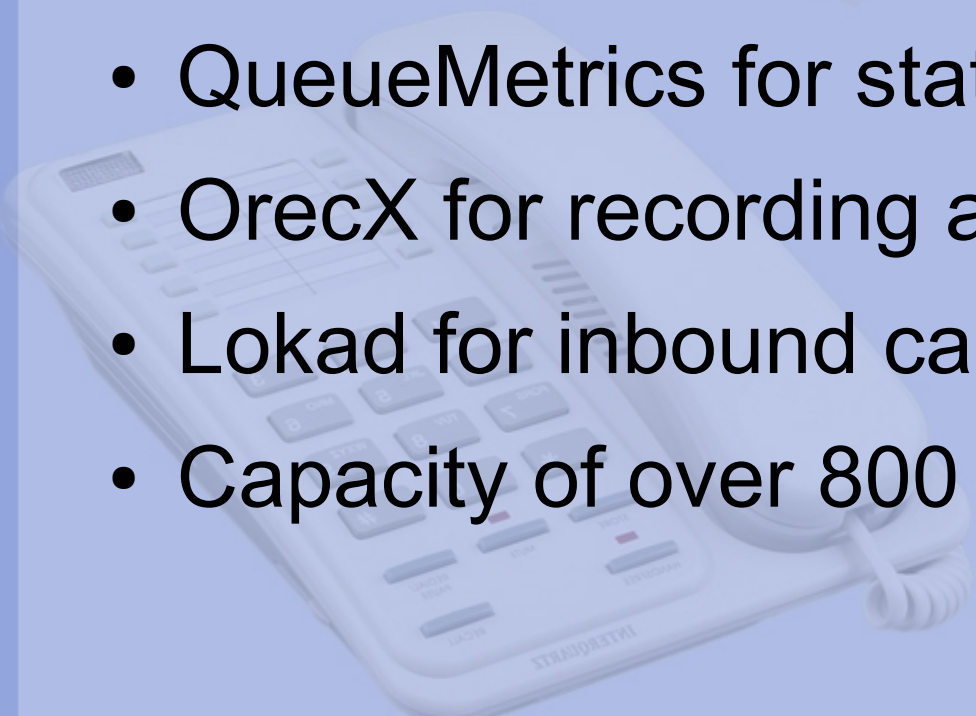
Network Architecture



- Multi-rack cage at Verizon co-location facility
- Point-to-point data connections to call center facilities
- Verizon SIP Trunks for Inbound call center
- Verizon voice DS3 into individual T1s for the outbound call center

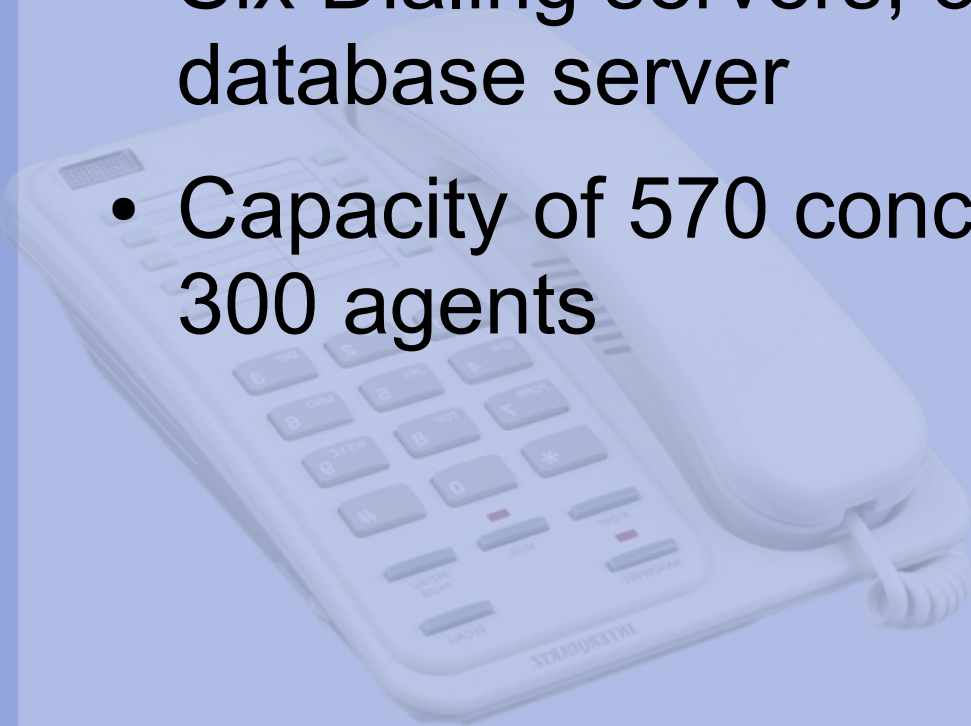
Inbound Call Center

- Balanced Verizon IP Trunking across two DS3 data circuits
- Multiple very-high-end servers to handle Asterisk Queues
- QueueMetrics for statistics and ACD reporting
- OrecX for recording and monitoring of agents
- Lokad for inbound call volume analysis
- Capacity of over 800 concurrent calls



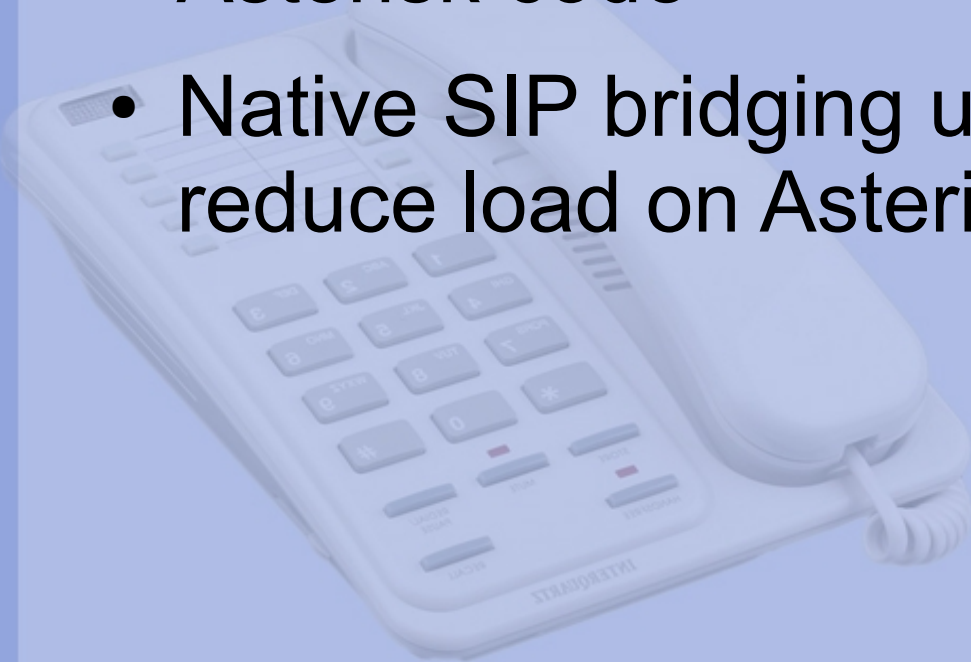
Outbound Call Center

- VICIDIAL call center suite
- QueueMetrics for integrated statistics and reports
- Six Dialing servers, one web server and one database server
- Capacity of 570 concurrent outbound calls and 300 agents



Asterisk

- Asterisk Queues handling up to 500 inbound phone calls per server
- Modified Asterisk code for extra inbound queues features and streamlining of the Asterisk code
- Native SIP bridging used wherever possible to reduce load on Asterisk



QueueMetrics

Demo Admin | Administrator
QueueMetrics
 call center monitor

Home Realtime **Live**

Live call center monitoring - 22:59:05

Queue(s): 00 All

Reload now

| Server | Queue | Tot. | Free | Pause | Talking | Other q. | Logoff | Length | Max wait |
|--------|--------|------|------|-------|---------|----------|--------|--------|----------|
| aleph | Q DPS | 1 | 0 | 0 | 1 | 0 | 5 | 0 | 0:00 |
| aleph | Q Test | 1 | 0 | 0 | 0 | 1 | 3 | 0 | 0:00 |

Export as...

Calls being processed:

| Server | Queue | Called ID | Wait | Talk | Q.Pos | Agent | Entered | Status |
|--------|-------|-----------|------|------|-------|----------------|------------------|--------|
| aleph | Q DPS | 896 | 0:00 | 0:34 | | John Doe (101) | 06/23 - 22:58:31 | AG |

Export as...

Agents currently logged in:

| Server | Agent | Status | Logon | Queues |
|--------|----------------|--------|---------|----------------------|
| aleph | John Doe (101) | Call | 8:52:56 | queue-test queue-dps |

Export as...

Server status

| Server | Status | Time (ms) |
|--------|--------|-----------|
| aleph | OK | 234 |
| trix | OK | 187 |

Export as...

In order to maintain session information, this page will reload automatically

- Proprietary, Closed-Source reporting package for Asterisk Queues and VICIDIAL
- Based on Java, uses Apache-tomcat web server and MySQL database
- Comprehensive historical and real-time reports

QueueMetrics

Home Answered Unans. Area Att. **Distrib.** Agents Outcomes All

Report Details:

Atomic queue(s) considered: 00 All
 Period start date: June 23 2007, 0:00
 Period end date: June 23 2007, 23:59
 Total calls processed: 1,002
 75.0% ans / 25.0% unans

Answered call distribution per day

| Day | Num | | Answered calls | Avg | Min | Max | Avg duration |
|------------|-----|-------|----------------|------|------|------|--------------|
| 2007-06-22 | 1 | 0.1% | | 0:20 | 0:20 | 0:20 | |
| 2007-06-23 | 750 | 99.9% | | 1:00 | 0:20 | 2:30 | |

Export as...

Answered call wait time per day

| Day | Num | | Answered calls | Avg | Min | Max | Avg wait |
|------------|-----|-------|----------------|------|------|------|----------|
| 2007-06-22 | 1 | 0.1% | | 0:20 | 0:20 | 0:20 | |
| 2007-06-23 | 750 | 99.9% | | 0:13 | 0:10 | 0:20 | |

Export as...

Unanswered call wait time per day

| Day | Num | | Unanswered calls | Avg | Min | Max | Avg wait |
|------------|-----|--------|------------------|------|------|------|----------|
| 2007-06-23 | 251 | 100.0% | | 0:10 | 0:10 | 0:10 | |

Export as...

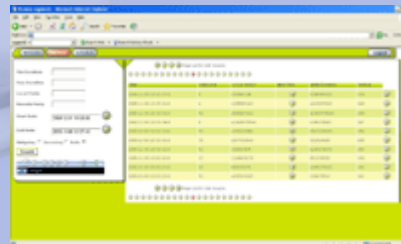
Sales per day

| Day | Conv. | Sales | | Contacts | |
|------------|-------|-------|--------|----------|--------|
| 2007-06-23 | 40.0% | 250 | 100.0% | | 375 |
| | | | | | 100.0% |

- Chat client for firefox sidebar
- Client used dedicated MySQL server for database and a dedicated Apache-tomcat web server

OrecX

- Network sniffing audio recording and monitoring application
- Base recording package is Open Source, user agent is paid-for software
- For T1/E1 recording, uses Sangoma RTP-tap to get audio streams from TDM to pseudo-VOIP
- Separate servers for OrecX collection/live-monitoring and for archive of recordings



VICIDIAL Call Center Suite

VICIDIAL web client - Mozilla Firefox

File Edit View Go Bookmarks Tools Help

http://10.10.10.16/agc/vicidial.php#

Logged in as User: 6666 on Phone: SIP/138pcom to campaign: TESTCAMP [LOGOUT](#)

VICIDIAL SCRIPT 2006-01-12 16:02:45 session ID: 8600100 **LIVE CALL**

STATUS: Incoming: 7275554032 UID: VD112160143000726926

PAUSE **RESUME** seconds: Channel: Cust Time:

RECORDING FILE: 60112160151_6666_7274514032
RECORD ID: 896316

STOP RECORDING

WEB FORM

PARK CALL
TRANSFER - CONF

HANGUP CUSTOMER

SEND DTMF

Customer Information:
Title: First: MI: Last:
Address1:
Address2: Address3:
City: State: PostCode:
Province: Vendor ID:
Phone: DialCode: Alt. Phone:
Show: Email:
Comments:

TRANSFER CONFERENCE FUNCTIONS:
INTERNAL CLOSER **LOCAL CLOSER** CODE **HANGUP XFER LINE** **HANGUP BOTH LINES**

NUMBER TO CALL: SECONDS: CHANNEL: DIAL OVERRIDE

DIAL WITH CUSTOMER **PARK CUSTOMER DIAL** **LEAVE 3-WAY CALL** **BLIND TRANSFER** **VM**

VICIDIAL web-client version: 1.0.59 BUILD: 51229-1028 Server: 10.10.11.11 **HOT KEYS INACTIVE**

[Hide conference call channel information](#)

LIVE CALLS IN YOUR SESSION:

| # | REMOTE CHANNEL | HANGUP |
|---|----------------------------|------------------------|
| 1 | SIP/138pcom-1fd3 | HANGUP |
| 2 | Local/78600100@demo-17f0,2 | HANGUP |
| 3 | Zap/25-1 | HANGUP |

Read 10.10.10.196

- Open-Source Call Center software, written in Perl and PHP and using MySQL for back-end
- Agent and Admin are web-based interfaces
- 50 to 100 agents per server

VICIDIAL Call Center Suite

MODIFY A LISTS RECORD: 101

List ID: 101 ?

List Name: test domestic lists ?

List Description: ?

Campaign: TESTCAMP ?

Active: Y ?

Reset Lead-Called-Status for this list: N ?

List Change Date: 2007-02-19 16:07:42 ?

List Last Call Date: ?

STATUSES WITHIN THIS LIST:

| STATUS | STATUS NAME | CALLED | NOT CALLED |
|-----------|--------------------|--------|------------|
| CALLBK | Call Back | 0 | 1 |
| CBHOLD | | 0 | 1 |
| DEC | Declined Sale | 0 | 1 |
| N | No Answer | 3 | 5 |
| NA | No Answer AutoDial | 2 | 0 |
| SUBTOTALS | | 5 | 8 |
| TOTAL | | 13 | |

TIME ZONES WITHIN THIS LIST:

| GMT OFFSET NOW (local time) | CALLED | NOT CALLED |
|-----------------------------|--------|------------|
| .5:00 (Mon Apr 2007 10:45) | 5 | 8 |
| SUBTOTALS | | 8 |
| TOTAL | | 13 |

CALLED COUNTS WITHIN THIS LIST:

| STATUS | STATUS NAME | 3 | 4 | 5 | 6 | 7 | 8 | SUBTOTAL |
|--------|--------------------|---|---|---|---|---|---|----------|
| CALLBK | Call Back | | | 1 | | | | 1 |
| CBHOLD | | | 1 | | | | | 1 |
| DEC | Declined Sale | 1 | | | | | | 1 |
| N | No Answer | 1 | 1 | 1 | 2 | 4 | 8 | 8 |
| NA | No Answer AutoDial | 1 | 1 | | | | 2 | 2 |
| TOTAL | | 3 | 1 | 2 | 1 | 2 | 4 | 13 |

[Click here to see all CallBack Holds in this list](#)

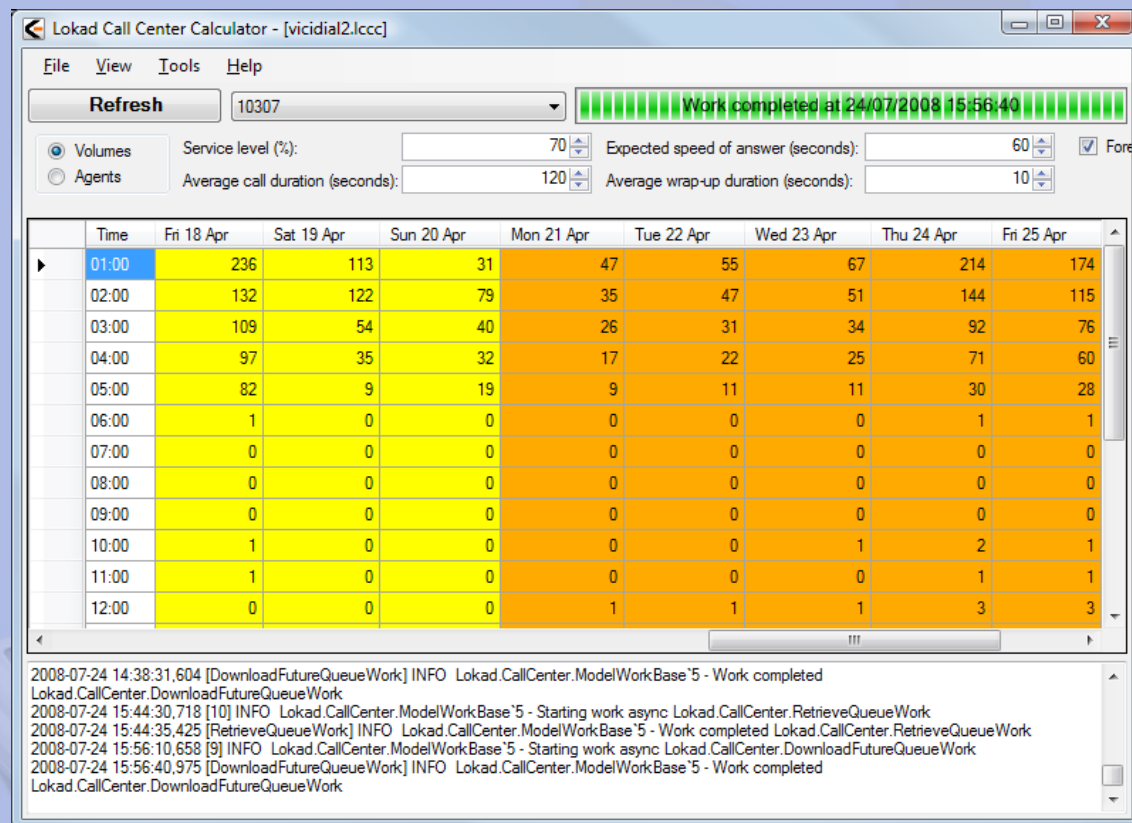
[DELETE THIS LIST](#)

script runtime: 0 seconds VERSION: 2.0.95 BUILD: 70402-1157

Done

- Supports inbound, outbound, blended and broadcast-dial call handling
- Six Asterisk/VICIDIAL servers for agents/lines
- Dedicated MySQL database
- Dedicated Apache web server

Lokad Call Volume Forecasting



- Desktop application
- Call forecasting based upon queue_log database table records generated by Asterisk or VICIDIAL
- Erlang C staff optimization levels

Custom Integration

- Asterisk and QueueMetrics reporting changed to correspond to business rules
- VICIDIAL call handling and agent call status are logged and able to be controlled to some extent by legacy applications through the use of an API



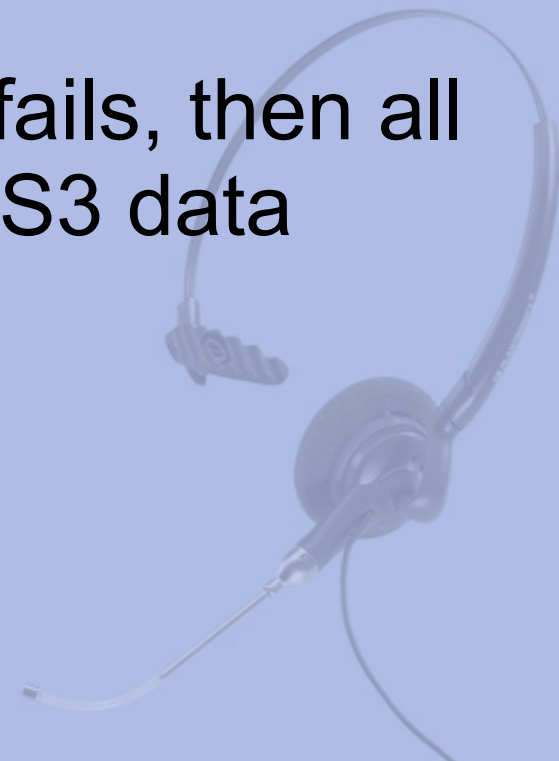
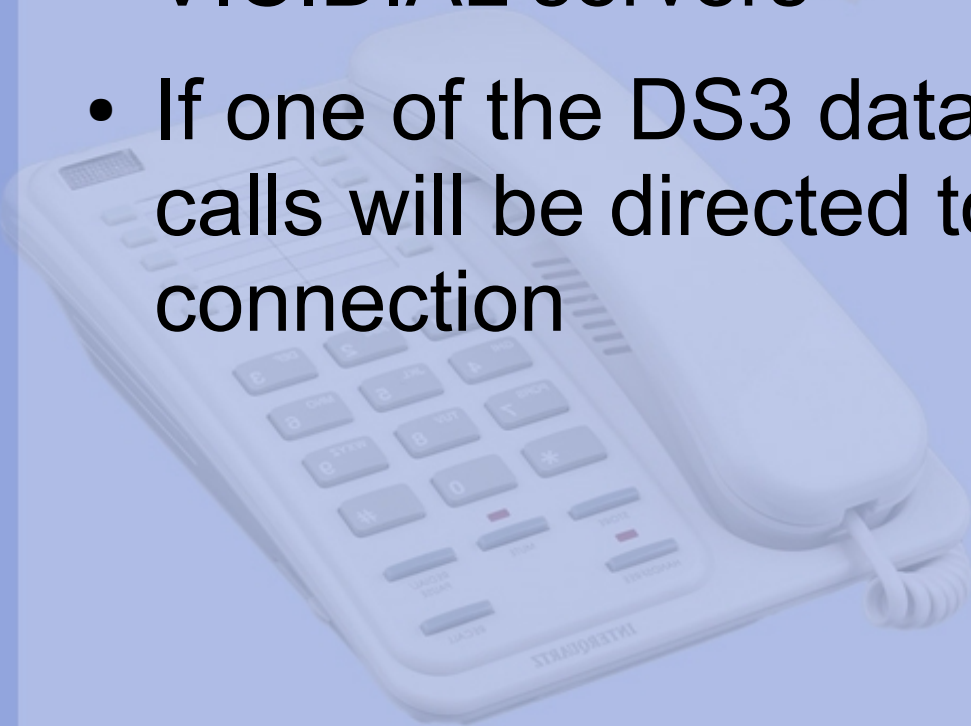
Load Balancing

- Inbound SIP trunk calls are balanced across the two DS3 connections, which also have fail-over
- As agents log into VICIDIAL, they are logged into the server with the least number of agents on it
- Web load balancing for the VICIDIAL agent interface is simple and non-session-specific



Fail-over Procedures

- Every agent SIP phone is registered to every Asterisk server
- If a VICIDIAL server fails, then agents can log back in within seconds using one of the other VICIDIAL servers
- If one of the DS3 data connection fails, then all calls will be directed to the other DS3 data connection



Future Projects

- Further integration with internal legacy systems
- Agent scheduling optimization with inbound ACD call volume forecasting
- Further roll-out of at-home agents



Thank you!

For more information, go to:

www.eflo.net

www.vicidial.com

