



## Expert Call Management through the Cirrus Load Balancer

PhoenixSoft developed a load-balancing module to further enhance Cirrus Softswitch performance. The Load Balancer application integrates within the Cirrus Softswitch to provide the best call management possible. By integrating several important capabilities, the Cirrus Load Balancer:

- Selects the best traffic routing based on call load.
- Detects an application failure and restores any resources used by the failed application.
- Allows greater end-to-end call volumes.
- Presents a single IP address to the public network for SIP messaging.
- Implements iptables to provide protection and network isolation.

### Optimizing Call Levels

When Cirrus' Load Balancer routes calls to a set of destinations, it keeps the load status, or number of ongoing calls, at optimum levels based on each destination's capacity. The Load Balancer routes calls to the least loaded destination at that particular point in time. To further clarify, "least loaded destination" means the destination with the largest available slot, not the destination with the smallest number of ongoing calls. The Load Balancer is preconfigured with the maximum load accepted by the destinations. As the Cirrus Softswitch routes calls, the Load Balancer provides full awareness of each destination's capacity.

Also, the Load Balancer receives feedback from the destinations. For example, if a gateway at a certain destination increases or decreases the number of sessions it has, the Load Balancer is notified. It records this change to maximum capacity and routes calls based on the new parameters.

Load Balancing functions differently than other standard routing mechanisms. The major distinction lies in the Load Balancer's ability to capture load information at each destination. For example, a "dispatcher" mechanism blindly forwards calls to destinations based on a probabilistic dispersion logic. This means it gets no feedback about the destination's load, like how many sent calls were actually established, or how many calls are still activated. Conversely, the Load Balancer uses load-balance logic to keep track of ongoing calls.

### Resource-Based Routing

Because all destinations are not alike, the Load Balancer does more than determine maximum capacity. It also looks at the type of services or resources the destination provides. For example, you may have a set of boxes for media-related services — each doing something different like transcoding, voicemail,

conferencing, simple announcements, PSTN termination, etc. And, you may have mixed boxes — one box may do PSTN termination and voicemail at the same time. So, for each destination, the Load Balancer defines the offered resources; and for each resource, it defines the capacity / maximum load as the number of concurrent calls the destination can handle.

Configuring the Load Balancer to define resource capacity is very simple. Basically, you pass information to the Load Balancer on what kind of resources various calls require. By doing so, you configure the Load Balancer routing script for appropriate resource detection. For example, you can see by the dialed number if the call must go to the PSTN, or if it's a voicemail or conference number. You can also look at the codecs to figure out if transcoding is required.

Then, the Load Balancer logic selects only the destinations that can provide the requested resources (see Diagram 1 below). With this scripted information, the Load Balancer automatically monitors the call, allocates resources, and releases resources when the call terminates.

Diagram 1. Example of Load Balancer Selection Algorithm

- 4 destinations/boxes in the LB set
- 1) offers 30 channels for transcoding and 32 for PSTN
  - 2) offers 100 voicemail channels and 10 for transcoding
  - 3) offers 50 voicemail channels and 300 for conference
  - 4) offers 10 voicemail, 10 conference, 10 transcoding and 32 PSTN

when calling load\_balance("1", "transc;pstn") ->

1) only boxes (1) and (4) will be selected as they offer both transcoding and pstn

2) evaluating the load :

- (1) transcoding - 10 channels used; PSTN - 18 used
- (4) transcoding - 9 channels used; PSTN - 16 used

evaluating available load (capacity-load) :

- (1) transcoding - 20 channels used; PSTN - 14 used
- (4) transcoding - 1 channels used; PSTN - 16 used

3) for each box, the minimum available load (through all resources)

- (1) 14 (PSTN)
- (2) 1 (transcoding)

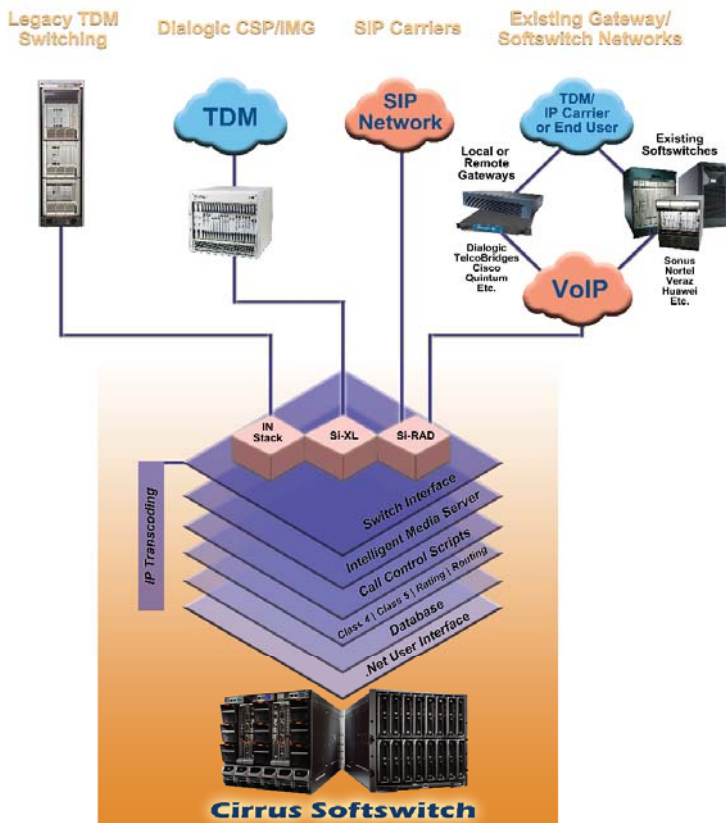
4) final selected box in (1) as it has the the biggest (=14) available load for the most loaded resource.

## A Next-Gen Switching Platform

PhoenixSoft developed the Cirrus Softswitch for service providers to integrate low-cost, feature-rich IP applications in a variety of network configurations. With the flexibility to work within any Legacy, TDM or VoIP environment, the Cirrus Softswitch IP-enables an existing TDM network and/or works in harmony with an existing network softswitch to add advanced functionality.

As a next-generation communications platform for converged networks, the Cirrus Softswitch offers:

- A single, integrated switching solution for tier one, two and three carriers
- Simpler, more efficient network architectures
- Powerful rating, routing, reporting and call flow scripting engines
- A robust feature set, advanced applications and carrier-grade reliability



## Cirrus Softswitch Features & Specifications

### Enhanced Switching Features

#### Rating/Tariffs

- Flexible rating and tariffing
- Provides for four (4) rating increments, multiple long charges and maintenance fees per call
- Use charges
- Real-time call rating
- A-Leg/B-Leg rating
- Cost/Wholesale/Retail Rating

#### Recharge Interface Options

- Real-time
- Credit card recharge
- Recharge vouchers
- Scratch cards/point of sale recharge
- Customer care recharge
- Cash top ups
- Short number access for recharge
- Siphon balance from new PIN

#### Security

- Max.calls per day/week/month
- PIN number access option and auto lockout for bad PIN
- Call screening, called number restrictions and simultaneous access blocking
- Maximum call length
- ANI blocking

#### Standard Class 5 Features

- 3-Way Calling
- Auto Attendant
- Call Block
- Call Forwarding
- Call Hold
- Caller I.D
- Call Return
- Call Transfer
- Call Waiting
- Follow-Me Service
- Hunting
- Personal 800
- Repeat Dialing
- Ring Groups
- SoftPhone
- Virtual Number
- Voice Mail
- Voice Mail to E-Mail

#### Traditional Telephony Interoperability

- E&M
- FXO
- MF and DTMF
- Feature Group D
- Loopstart
- PRI Protocols
- FXS
- Groundstart
- EuroSDN

#### Customer Care

- Web administration
- Internal routing to CSR
- Interface to payment mechanisms

#### Account Maintenance

- Automatic voice message notification of balance during call with low balance warning
- Master Accounts permit multiple users to draw pre-paid balances off a single master account
- Supports multiple language prompts

#### Tandem Features

- Class 4 Tandem Switching
- One Number/Follow-Me Calling
- International Callback, DID, Web Trigger, SMS Trigger
- 800 Redirect

#### Fully Integrated Functionality

- IP Transcoding
- Session Border Controller
- IP PBX
- Customer Services
- Convergent Billing
- Retail Web Portal

#### Retail Web Portal

- On-Line Ordering and Payment Processing
- Customizable Screens
- Unlimited Automated Capabilities
- Password-Protected Customer Sites
- Plus much more

#### Codecs Supported

- ADPCM
- G.711 (A-Law &  $\mu$ -Law)
- G.723.1\* (pass through)
- G.729\*
- GSM
- iLBC
- Linear
- LPC-10
- Speex

\*Third-Party Licensing Required

# PHOENIXSOFT

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