

Troubleshooting VoIP



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Overview

Common problems and causes

- Call drops, call quality issues

Best practices for troubleshooting

Network monitoring tools

- To identify and resolve VoIP issues



Most Common Problems in VoIP

Unable to call

Call drop



Feature and Function Configuration Issues



Call routing

- Most important feature

Call routing configuration

- Quite critical

VoIP issues

- Unable to make or receive calls
- Call Hold, call transfer, call conferencing
- Music on hold

Misconfiguration

- Missing step



Feature and Function Configuration Issues



Troubleshooting configuration-related issues

- Validate the configuration
- How to correctly configure
- Features or functions

Configuration and feature guides

- Recreate the issues in the lab
- Knowing the configuration well
- Confident



Other Component Misconfiguration



- SIP trunk
- Firewall-related configuration
- Network settings
- Network mask
- Gateway
- DNS
- Quality of Service (QoS)

Build and validate

- Physical connectivity
- Network devices
- Application configuration



Calling Privilege

Unable to make or receive calls

**Unable to call specific type
Long-distance or international
calls**



Calling Privilege

No rights

Internal calling

Inter-site calling

Inter-department

PSTN calling

New York to London



**No calling privilege.
Each call type requires
configuration.**



Device Registration Issues

IP Phones

**Register with the
call-processing
server**

Simple process

**Depends on
underlying network**

**Reachability to the
call-processing
server**

Device configuration



Device Registration Issues

Different devices

Different protocols

SCCP or SIP

SIP protocol supported on most

Ease in the device registration

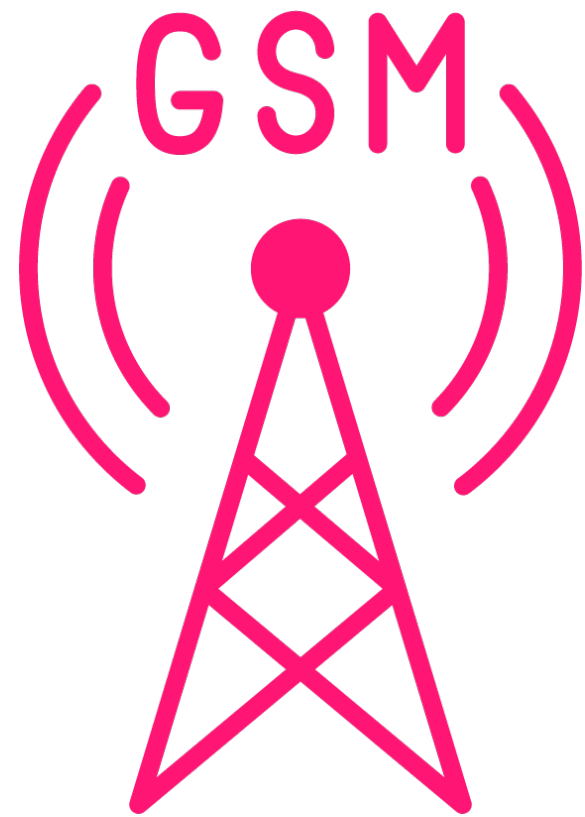
Difficult with third-party devices

Supported device

Follow configuration guide



PSTN Call Failure



Inbound and outbound calls

PSTN connectivity

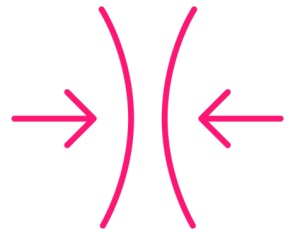
- Using voice gateway
- With a SIP trunk
- To IP telephony service provider
- ISDN protocol
- T1-PRI or E1-PRI

Misconfigured gateway configuration

- Expect PSTN calls routing issues
- IP telephony service provider settings



Network Congestion



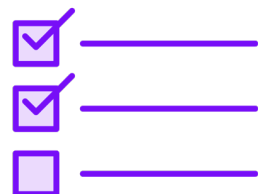
A congested network causes call drops



Striking the right balance



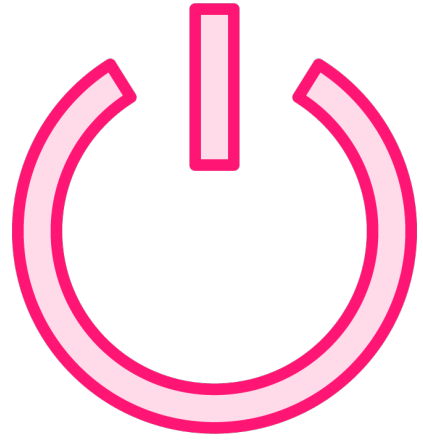
Enough dedicated bandwidth for calls



Adequate planning



Power Outage



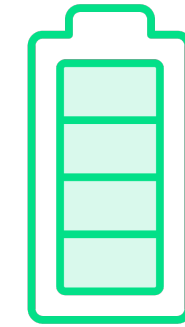
**Uninterrupted
power**



**No power to call
processing
server**



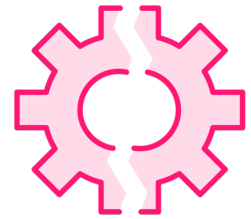
**No power to
network devices**



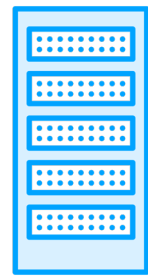
Power backup



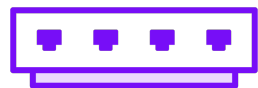
Device Failure



Hardware failure



VoIP components - call processing servers, network



Switches, gateways, firewalls



Crash can cause VoIP calls failure



Device redundancy plan



Firewall Restrictions

Call drops

- Caused by the firewalls
- Blocks traffic
- RTP
- Allowing end-to-end VoIP traffic



Codec mismatch

Different codecs

Compatibility issues

Transcoders

Translate between codecs

Limited or no Transcoder

Causes call failure



Audio Quality Related Issues

Strong background noise

Too loud

Echoes

Uninvited guests

Mute your microphone

Everybody wants to talk



Audio Quality Related Issues

Soundproof and buy a good headset

Noise and echo cancellation feature

Available in Cisco WebEx, Microsoft Teams or Zoom

Introduction of a signal or voltage into the VoIP connection

Loose wires, or different power supply





Best Practices for Troubleshooting and Resolving VoIP Issues



Network Monitoring and Notification System



Quality and reliability

- Real-time visibility
- Network performance
- Identify and resolve issues
- Improves user experience
- Quickly resolution
- Before large impact

Key performance indicators

- Latency, jitter, packet loss
- Analyze and identify the root cause



Removing a Single Point of Failure

**Significant
disruptions**

**Identify and
eliminate**

Seamless experience



Removing a Single Point of Failure

Single switch in a network

Single power supply in a server

Entire system down

Damaging to businesses

VoIP dependent

Mission-critical operations



Removing a Single Point of Failure

Implement redundancy

Duplication of key components

Multiple switches in a network

Multiple power supplies in a server



Operational Manuals and SOP Documentation



Operational manuals

Standard operating procedures

Standard business documentation

- Collection of written materials

Outline

- Structure, objectives, processes,
- Expectations of a business.
- Standards and best practices
- Efficiency, stability, and success



HLD (High-Level Design)

Overview of the UC infrastructure

Architecture, design, and
organizational details



Detailed description

Design specifications

Technologies used

Implementation details

Physical rack layout

Site address

Power supply

Connectivity

Network details

IP address or ports

LLD (Low-Level Design)



SLA (Service Level Agreement)



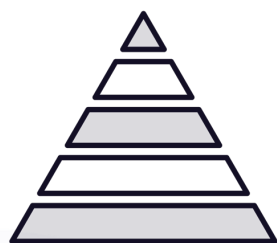
Contract between a service provider and a customer



Service details



Network uptime and resolution time



Different severity of tickets



Escalation Matrix

Defines a system

When to escalate

Who to escalate

At different levels



Disaster Recovery and Backups



Critical

- Successful VoIP infrastructure
- Operate in the event of an outage
- Preserving communication capabilities
- Minimizing downtime
- Creation of redundant devices
- Configuration backups
- Regular testing
- Regular review and update



Business Continuity Plan

Comprehensive plan

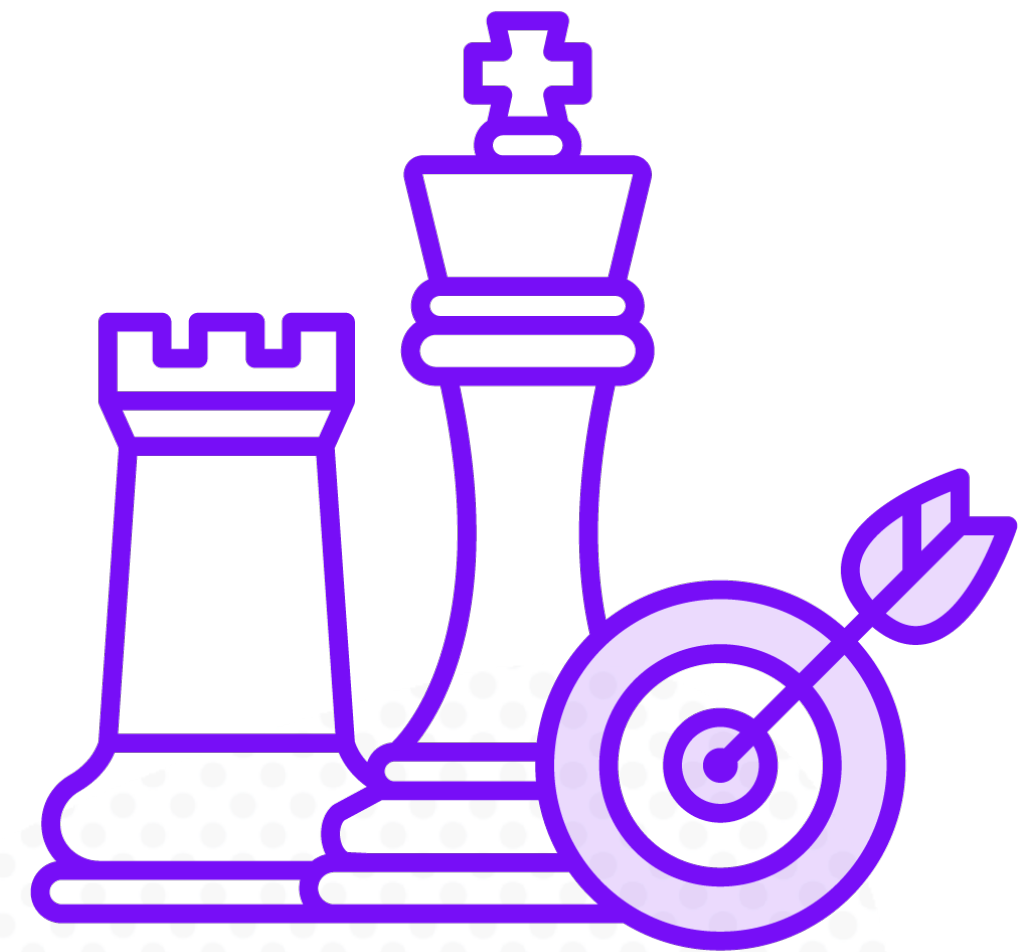
Continue to operate
In unexpected event

Detailed plan

Maintaining communications
Important data backup
Recovery procedures
Escalation matrix

Responsible

Decision making
Communication



Business Continuity Plan

Complete outage

Invoke BCP

IPTSP routes call to alternate location

Auto attendant or IVR

Reach end users

Directory services



Demo

Microsoft Teams admin center (TAC) to identify and resolve VoIP issues



Summary

Summary

- Common problems and different causes
- How to approach those issues

Best practices for troubleshooting

- Monitoring and notification system
- Disaster Recovery and Backup
- Business Continuity Plan (BCP)

