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Advanced Outbound Routing

3CX

Goal of this Module

- How Outbound Rules Work
  - → Criteria Matching
  - → Outbound Blocking Rules
  - → System Extensions
- Outbound Routing for Emergency Numbers
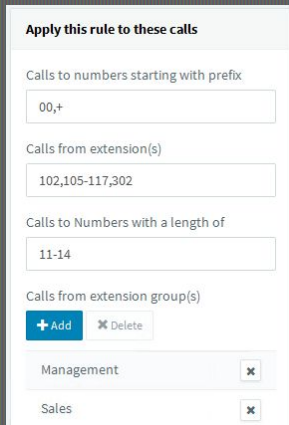- Achieve Least Cost Routing

Prerequisites: Least Cost Routing

- Covered Chapter - 1.4 SIP Trunks
- Outbound Rules Knowledge

Outbound Rules: Matching Criteria

- Prefix
  → What the dialed number starts with
- Calls from Extensions
  → Extension the call is originating from
- Number Length
  → The length of the dialed number
- Calls from Extension Groups
  → The extension groups from which the extension dialing is in

Outbound Rules: Matching Criteria

- Rules are checked top to bottom
  → First match stops
  → Will not check next Outbound Rule
- Blank entries are ignored
- All 4 blank does not mean "All Calls" → At least one criteria is required
- Fields can accept
  - Single Values
  - Comma-separated values
  - Value Ranges
  - Combinations of the above → e.g. Calls from Extension: 102,105-117,302

Apply this rule to these calls

Calls to numbers starting with prefix

`00,+`

Calls from extension(s)

`102,105-117,302`

Calls to Numbers with a length of

`11-14`

Calls from extension group(s)

+ Add   **✕ Delete**

| Management | ✕ |
| Sales | ✕ |

Outbound Rules: Matching Criteria

- To match a Rule:
    - Prefix and
    - Number Length and
        - Call from Extension

                or

        - Call from Extension Group

- In code or script:

→ If ([Prefix] && [Number Length] && ([Extension] || [Extension Group]))

Outbound Rules: Routes

- Once Criteria is met → Based on dialed number
  - Reformat number
    - → Strip Digits from the beginning of the number
    - → Prepend Digits at the beginning of the number
  - Checks Routes in numeric order
    - → Fail
    - → Move to next Route
  - Call fails when
    - → All set Routes fail
    - → Block Calls is in all Routes

Make outbound calls on

Configure up to 5 routes for calls. The fourth and fifth route will be used as backup. For each route, digits added.

			Strip Digits	Prepend
Route	1	VoIP Provider	0	
Route	2	PSTN Gateway	1	0044
Route	3	BLOCK CALLS	0	
Route	4	BLOCK CALLS	0	
Route	5	BLOCK CALLS	0	

Outbound Rules: Blocking

- Can use Outbound Rules to disallow calls
- Exactly like normal Outbound Rules
  → but set Block Calls in all 5 Routes
- Order is important!
  → Once criteria is met
  → Will not move to the next Outbound rule

Outbound Rule Name	Call from extension(s)	Prefix	Length	Extension Group	Route1	Route2	Route3	Route4	Route5	
Calls to Remote Office		6	4		Bridge to Re...	BLOCK	BLOCK	BLOCK	BLOCK	✕
Block All Calls for Certain Extensions				Sales,Support	BLOCK	BLOCK	BLOCK	BLOCK	BLOCK	✕
Allow All Calls		1-9			VoIP Provider	BLOCK	BLOCK	BLOCK	BLOCK	✕

Outbound Rules: System Extensions

- Voice Mail
- Conference Server
- Forwarding to Outside Number
  → Extension Profiles / Exceptions
  → Queues
  → Ring Groups
- External Call Redirection
- Queue Callback

Outbound Rules: System Extensions

- Are not (User-) Extensions
- Are not part of any Extension Group
- Outbound Calls from System Extensions will fail when
  → From Extension criteria

  and / or

  → From Extension Group criteria
- Solution
  → Order Rules so that extension rules are at top
  → Insert a Block Outbound Rule for all user-created extensions
  → Insert Outbound Rule(s) without From Extension (Group)

Outbound Rules: System Extensions

- Example
  - Allow User-Created Extension calls
  - Block All Calls for User-Created Extensions
  - Allow Calls for System Extensions

Outbound Rule Name	Call from extension(s)	Prefix	Length	Extension Group	Route1	Route2	Route3	Route4	Route5	
International Calls - Management		00		Management	VoIP Provider	BLOCK	BLOCK	BLOCK	BLOCK	✕
Block International Calls - Sales,Support		00		Sales,Support	BLOCK	BLOCK	BLOCK	BLOCK	BLOCK	✕
National Calls		0		Management,Sales	PSTN Gateway	VoIP Provider	BLOCK	BLOCK	BLOCK	✕
Local Calls		1-9	1,2,3,4,5,6,7	Management,Sales,Support	PSTN Gateway	BLOCK	BLOCK	BLOCK	BLOCK	✕
BLOCK ALL User-Created Extensions		0-9		Management,Sales,Support	BLOCK	BLOCK	BLOCK	BLOCK	BLOCK	✕
System Extension - International		00			VoIP Provider	BLOCK	BLOCK	BLOCK	BLOCK	✕
System Extension - Local and National		0-9			PSTN Gateway	BLOCK	BLOCK	BLOCK	BLOCK	✕

Concept: Least Cost Routing

- Route Outbound Calls so as to minimize call cost
- Configure 3CX to identify calls by using the Outbound Rule criteria
- Configure Outbound Rules to select correct lines
- Rule Order

Example Scenario

- PSTN Gateway → Local Landline Calls
- GSM Gateway → Local Mobile Calls
- VoIP Provider → Long Distance and International Calls
- Bridge
    → Bridged Extension Calls
    → Calls over Bridge-Connected Lines/Gateways

Dialled Number Format (EU)

- Local (London to London) → Prefix 1-9
- Long Distance (London to Oxford) → Prefix 0
- International Dialing Format (London to Madrid, Spain) → Prefix 00
- Bridge Calls → Prefix 6 + Extension Number (E.g. 153)

Rule for Local Calls

- Rule to match Local Calls → Prefix: 1-9
- Route call through PSTN Gateway

Rule for Local Calls (Long Distance Format)

- Rule to match Local Calls → Prefix: 020
- Route call through PSTN Gateway after → Strip Digits: 3

Rule for Local Calls (International Format)

- Rule to match Local Calls → Prefix: 004420
- Route call through PSTN Gateway after → Strip Digits: 6

Rule for Mobile Calls

- Rule to match Mobile Calls → Prefix: 07
- Route call through
  - → Priority 1: GSM Gateway
  - → Priority 2: PSTN Gateway

Rule for National Calls

- Rule to match Long Distance Calls → Prefix: 0
- Route call through
  - → Priority 1: PSTN Gateway
  - → Priority 2: VoIP Provider

Rule for International Calls

- Rule to match International Calls → Prefix: 00
- Route call through → VoIP Provider

Ordering Rules Correctly

- Intention: International Calls routed through VoIP Account
- Actual Behavior:
    → FIRST Matching Rule will deliver the call
    → Call is routed through PSTN Gateway
- Diagnosis: Incorrect Ordering of Outbound Rules

Outbound Rule Name	Call from extension(s)	Prefix	Length	Extension Group	Route1	Route2	Route3
Local Calls		1-9			PSTN Gateway	BLOCK	BLOCK
Local Calls (Long Distance format)		020			PSTN Gateway	BLOCK	BLOCK
Local Calls (International Format)		004420			PSTN Gateway	BLOCK	BLOCK
Mobile Numbers		07			GSM Gateway	PSTN Gateway	BLOCK
National Calls		0			PSTN Gateway	VoIP Provider	BLOCK
International Calls		00			VoIP Provider	BLOCK	BLOCK

Ordering Rules Correctly

- Raise Priority of International Calls rule
- New configuration with correct routing

Outbound Rules

+ Add | Edit | ✕ Delete | ↑ Move Up | ↓ Move Down

Search ...

Outbound Rule Name	Call from extension(s)	Prefix	Length	Extension Group	Route1	Route2	Route3
Local Calls		1-9			PSTN Gateway	BLOCK	BLOCK
Local Calls (Long Distance format)		020			PSTN Gateway	BLOCK	BLOCK
Local Calls (International Format)		004420			PSTN Gateway	BLOCK	BLOCK
Mobile Numbers		07			GSM Gateway	PSTN Gateway	BLOCK
National Calls		0			PSTN Gateway	VoIP Provider	BLOCK
International Calls		00			VoIP Provider	BLOCK	BLOCK

Rule for Calls to Bridge Extensions (Prefix)

- **Rule to match Bridge Extensions**
  - → Prefix: 6
  - → Digit Length: 4

- **Route call through**
  - → Bridge Connection
  - → Strip Digits: 1

Add Outbound Rule   OK   Cancel

General

Rule Name

Calls to German Office

Apply this rule to these calls

Calls to numbers starting with prefix

6

Calls from extension(s)

Calls from extension(s)

Calls to Numbers with a length of

4

Calls from extension group(s)

＋ Add   ✖ Delete

Make outbound calls on

Configure up to 5 routes for calls. The fourth and fifth route will be used as backup. For each route, digits can be stripped or added.

			Strip Digits	Prepend
Route	1	Bridge to DE Office ▼	1 ▼	
Route	2	BLOCK CALLS ▼	0 ▼	

Rule for International Calls to Germany (Bridge)

- Rule to match Calls to Germany → Prefix: 0049 (or +49)
- Route call through
  - → Bridge to DE Office
  - → Strip Digits: 4
  - → Prepend: 0
  - → Priority 2: VoIP Provider

Emergency Numbers

- Identify all Emergency Numbers
- Make sure that you do not have Extensions with those numbers
  → If you use 3-digit extensions
  → Do not create Extensions 112, 911, 999, etc
- Create Outbound Rules for all Emergency Numbers
  → Prefix = Emergency Number
  → Digit Length = Emergency Number Length

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