TELES.iPBX

Systems Manual

Version 1.5

For TELES.iPBX Software Version 1.5

TELES AG
Berlin

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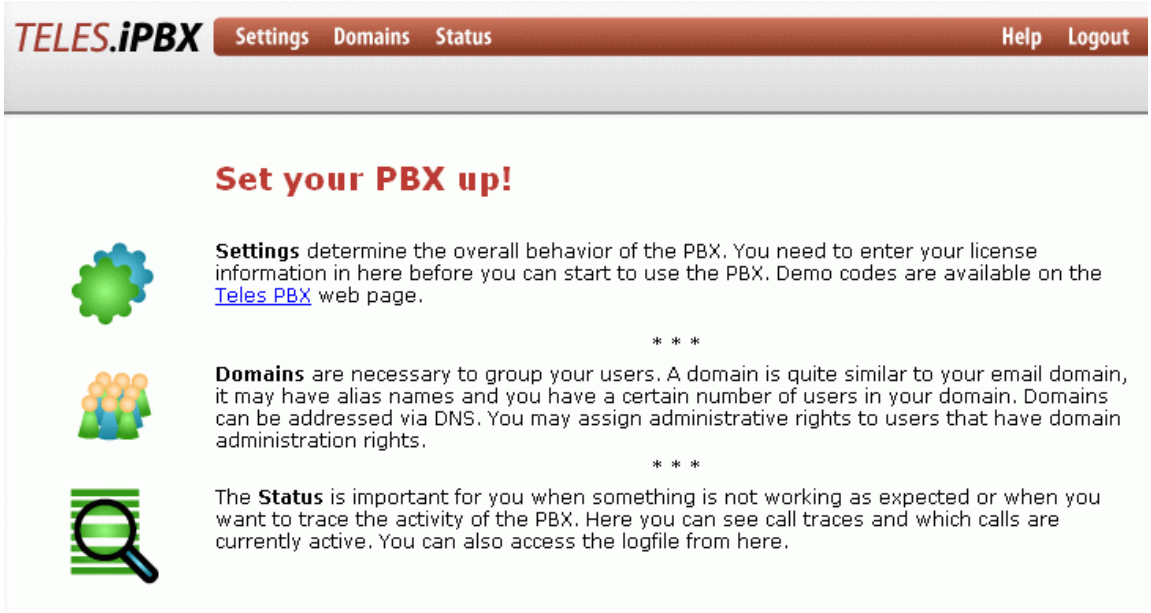
1 Overview



The TELES.iPBX is a soft PBX that runs as an add-on application on TELES CPE devices. These include TELES.VoIPBOXes (BRI or analog) and TELES.VoIPGATEs (PRI) and are used to connect local IP telephones and soft phones, as well as traditional line-based PBX extensions and telephones. The connection to the public telephone network can occur via VoIP, through the traditional PSTN network, or a combination of both. Both analog and ISDN (BRI/PRI) lines can be connected as PSTN. Connection to the carrier can occur using SIP, H.323, or a combination of both. Multiple VoIP destinations can be can be mapped through the routing process. The TELES.iPBX can be used to add local or remote IP extensions (work@home) to an existing PBX without requiring changes to the existing PBX, or you can implement the TELES.iPBX to completely replace your old PBX.

1.1 Features

- Caller ID
- Call forward/transfer
- Call parking/retrieve
- Conference calling
- DND (Do Not Disturb)
- Music on hold
- Direct inward dial access
- Direct outward dial
- Different dial plans
- Hunt groups

- Push to talk
- Dial by name
- Fax support
- Voicemail
- IVR

1.2 Startup

The TELES.iPBX is a service that runs in the background and the process starts automatically.

1.3 Logon

A standard web browser is used to communicate with the TELES.iPBX.

To get a logon prompt, enter the system's IP address in the web browser. By default, this will be port 80, which is the system's default port.

The TELES.iPBX also supports the secure transport HTTPS. If you use this transport layer, the data between the TELES.iPBX and the web browser is transported using the secure HTTPS protocol. The TELES.iPBX will offer a certificate that will cause an alert on the local web browser. Please ignore the alert or add it to your web browser's trusted certificates.

You can log on in one of two ways:

- As system administrator
- As domain administrator

1.3.1 Logon as System Administrator

In this mode, you have access to all TELES.iPBX resources. There is exactly one system administrator mode. Make sure that the logon information is kept in a safe place.

By default, the logon name is `admin` and the password is empty.

1.3.2 Logon as Domain Administrator

In contrast to the system administrator, several accounts can have permission to act as domain administrator, even within one domain.

To log on as domain administrator, you must enter the user name and domain name in the **user@domain** dialog, for example `123@test.com`, and enter the password. If you have just one domain, you may omit the domain name after the

@ sign. If you have more than one domain and omit the domain name, the system will automatically add **@localhost** behind the account name.

The domain administrator password is the same as the domain administrator's account (extension) password..

2 Integration with the TELES.VoIPBOX/ TELES.VoIPGATE

Integration of the TELES.iPBX with your TELES.VoIPBOX or TELES.VoIPGATE occurs quickly and easily with a few minor configuration entries in the system's `pabx.cfg` and `route.cfg`.

2.1 Configuration in the pabx.cfg

Only one change in the `pabx.cfg` is necessary to integrate the TELES.iPBX with your system. Since the TELES.iPBX uses port 5060, the system's SIP port must be changed to 5062. This occurs in the section `IP Configuration` as follows:

```
; 7) IP Configuration t
; ---------------------
VOIP=Yes
VoipGlobalMaxChan=8
H225Port=1720
SipPort=5062
VoipRtpPort=29000
VoipRtpPortSpacing=2
```

2.2 Configuration in the route.cfg

The TELES.iPBX requires its own profile in the system's `route.cfg`. You can choose any name for this profile. We recommend that you select a meaningful name. For the purposes of our description here, we will call this profile `[Voip:PBX]`. The profile must include the following entries:

```
[Voip:PBX]
VoipDirection=IO
VoipPeerAddress=127.0.0.1
VoipIpMask=0xffffffff
VoipCompression=g711a g711u
VoipSilenceSuppression=No
VoipSignalling=1
VoipMaxChan=8
VoipTxM=2
VoipProxy=127.0.0.1:5060
VoipOwnAddress=127.0.0.1:5062
VoipContact=127.0.0.1:5062
VoipRFC2833PayloadType=101
VoipDtmfTransport=3
VoipOwnDisplay=MSN
VoipMediaWaitForConnect=Tone
VoipT303=5
VoipUseIpStack=Yes
```

Note: Bear in mind that the system will use port 5062. Therefore, a VoIP proxy must be configured in all additional VoIP profiles as follows: `VoipProxy=<ip addr>:5060`

You can also attach ISDN telephones to the TELES.iPBX using a new registrar profile for each ISDN telephone number. We recommend that you select a meaningful name. For the purposes of our description here, we will call this profile `[Registrar:<msn>]`.

The following entries are required:

```
[Registrar:<msn>]
RegId=127.0.0.1
RegOwnId=sip:<msn number>@127.0.0.1
RegContact=<msn number>@127.0.0.1:5062
RegDisplay=<msn number>
RegUser=<msn number>
RegPwd=<password>
RegExpires=1800
RegProxy=127.0.0.1:5060
```

2.3 Examples

Example 1 In the following example, all outgoing calls to numbers beginning with 200 are routed through the TELES.iPBX. All incoming VoIP calls are routed to ISDN controller 10:

```
MapAll200=|40PBX:200<<24
Restrict40=toISDN
MapAlltoISDN=10
```

Example 2 In the following example, an ISDN telephone with the msn 128 is attached to the TELES.iPBX:

```
[Registrar:128]
RegId=127.0.0.1
RegOwnId=sip:128@127.0.0.1
RegContact=128@127.0.0.1:5062
RegDisplay=128
RegUser=128
RegPwd=128
RegExpires=1800
RegProxy=127.0.0.1:5060
```

The actual routing configuration will depend on your own scenario. For a detailed description of routing configuration options, please refer to the Systems Manual included with your TELES.VoIPBOX or TELES.VoIPGATE.

3 System Administration

After you have logged on as system administrator, you will be redirected to the main screen for system administration. Three submenus will appear:

Table 3-1 System Administration Submenus

Submenu	Description
Settings	Defines the TELES.iPBX's general behavior.
Domains	You can group your users here. A domain is similar to your e-mail domain in that it has alias names and a certain number of users. Domains can be addressed via DNS. You can assign administrative rights to users with domain administration rights.
Status	This submenu is useful for checking functionality and for tracing the TELES.iPBX's activity. It is also possible to access the log file from here.

You can move to one of the submenus by clicking on the icons or by using the menu links on the top of the page.

3.1 Settings

The settings in this section affect the behavior of the complete TELES.iPBX, which means it will affect all domains.

3.1.1 System Settings

3.1.1.1 General

The TELES.iPBX supports various languages in the following areas. Bear in mind that your TELES.iPBX only has audio files in the language you order. To change the audio files, please contact TELES support:

- The **Audio Language** determines which IVR prompts are used. Mailbox messages are in the language set here.
- Using the **Tones** drop-down menu you can select country-specific ring tones.

3.1.1.2 Logging

When you install the system, you want to see how it works and how the TELES.iPBX interprets the input to the system. Logging is a powerful mechanism to track the system's activity.

The TELES.iPBX maintains a list of log messages. When you enter a filename, it writes a copy of the log messages to the file system.

The **Log Level** defines which log messages are put into the log. The range is between 0 and 9. If you select level 0 you will see only the most important messages, if you select level 9 you will see all of the system's available log messages. Please note that choosing log level 9 creates additional load for the system and may create very large log files.

The **Log Length** defines the length of the internal log message buffer. This buffer is used to show the log messages in the web interface.

If you set a **Log Filename**, the system will write the log messages to the filename you provide. If you put a dollar sign into the log filename, the system will replace the dollar sign with the current day. This will ensure that the log files do not grow too large. Delete old log files occasionally, so that your file system does not get overloaded.

One of the first log messages you will see is the working directory. If the **Log Filename** does not contain a path, the system will write the log file into that directory.

Note: Don't forget to lower the log level once the system is running. Otherwise a hard disk full error will eventually result and the TELES.iPBX will no longer be able to save runtime data.

3.1.1.3 SIP Logging

When the TELES.iPBX sends or receives SIP packets, it determines a log level for each event. The SIP **Log Level** defines which SIP log messages are included in the TELES.iPBX's log. The priority order here is reversed from that specified for general TELES.iPBX logging. Select 0 to log all packets for the message type indicated. Select 9 to eliminate traffic of the message typed indicated from the log.

To simplify troubleshooting, the administrator can set the SIP packet's log level as follows:

- **REGISTER** packets may have their own log level. If you are not interested in the registration traffic, set this at a high level (e.g. 9)
- **SUBSCRIBE/NOTIFY** applies for message waiting indications and LED state.
- **OPTIONS** are sometimes used to keep the SIP connection alive. In this case, you will see many of these requests.
- All **Other** packets usually belong to an ongoing call (e.g. INVITE, CANCEL, ACK, BYE).

The watch list filters the SIP packets by IP address. List IP addresses in the **Watch List (IP)** box (you may use subnet masks) and define the **Watch List Log Level**.

This feature is useful when you want to watch a specific device in the TELES.iPBX's log.

3.1.1.4 Administrator Login

After you start using the system, change the administrator credentials. You might want to change the name of the administrator account. The default setting is `admin`. This name may not contain an @ sign, as the TELES.iPBX must be able to distinguish it from a domain administrator login.

The system will store the administrator password in encrypted form, which provides you with a basic security level for the password's visibility. The password itself is not transmitted in clear text to the web browser, the TELES.iPBX generates a dummy text that will be displayed as bullets on most web browsers. To ensure that the password is kept safe after setting it, use the HTTPS secure connection to the system.

3.1.1.5 Appearance

You can alter the TELES.iPBX's web interface as follows:

Default CDR Listing Size tells the system how many CDRs to display on the web interface. This setting helps avoid displaying too many CDRs at a time.

Keep CDR Duration defines how long the CDRs are kept in the database. The default setting is 14 days.

The duration is expressed in the following time units. Enter an **s** behind the number to define seconds, an **m** to define minutes, an **h** to define hours or a **d** to define days. For example, an entry of **10d** means CDRs are kept for 10 days.

You can access the TELES.iPBX through a SOAP interface. The **SOAP Trusted IP** tells the TELES.iPBX from where it may accept SOAP requests. This setting is important for your security, as the SOAP allows access to most of the TELES.iPBX's features. The format of this setting follows that of the **SNMP Trusted Addresses**.

Another feature is the reporting of call detail record (CDR) information in the SOAP format. The setting **SOAP CDR URI** tells the TELES.iPBX where to send the SOAP requests. This setting must be a complete HTTP URI, for example `http://192.168.2.3/rpc/cdr.php`.

Most SIP phones do not have a recording button. You can define DTMF keys as **Record on** and **Record off** keys to start and stop recording. The keys must be one character, including 0-9, * or #. Recording is triggered only on connected calls. Please bear in mind that the other side may hear the trigger tone and that this fea-

tures may have adverse effects on other features, for example, when you call an external mailbox and use the keys for navigation.

3.1.1.6 Performance

The **Maximum Number of Calls** setting defines how many simultaneous calls the system allows. Because every call takes a certain portion of the available CPU, allowing too many calls will affect the quality of all ongoing calls. By limiting the number of calls on the CPU, you can reject calls that would otherwise potentially degrade the overall performance.

The **Maximum Duration of Call Recording(s)** sets an upper limit to call recordings. This setting is important because recording files might become very large and can cause problems with system performance. There is also a domain setting that limits the recording of a mailbox message.

In a SIP environment, the registrar determines how long user agents may be registered. Short registration times have a negative impact on performance, but ensure that the user agents stabilize quickly following a lost connection to the TELES.iPBX. The **Minimum Registration Time** and the **Maximum Registration Time** settings are used to define the lower and upper limits for the registration time. Typical values are from a few minutes to several hours. The settings are in seconds.

If the registering user agent is behind NAT, the TELES.iPBX uses the settings **UDP NAT Refresh** and **TCP/TLS NAT Refresh**. The TELES.iPBX only registers agents using the UDP transport layer for a short time, so that the user agents will reregister quickly and keep the NAT bindings alive. Typically the settings for UDP will be between 15 and 45 seconds. TCP/TLS connections do not need to refresh the bindings so often. A few minutes will suffice in most situations.

Maximum call duration settings define the upper limit for call duration. The default setting is two hours.

3.1.1.7 SIP Settings

SIP specifies a short form for certain headers. Short headers save space in messages, which reduces the probability that problems will occur with the maximum message size in UDP. Because some devices cannot handle short headers, the TELES.iPBX offers both short and long headers. To maximize interoperability, the default value for this setting is **long**. If you encounter UDP packet fragmentation problems (message size above 1492 bytes), switch to the short header form.

Sip also has its own multicast group. Usually a SIP device knows where to send requests, but during startup and configuration, a user-agent may want to locate the

TELES.iPBX with a multicast request. When the setting **Listen to sip.mcast.net** is active and you are using user-agents with multicast detection, you can plug the devices into the network and they will retrieve configuration information automatically.

In hosted environments, the service provider might want to set trunks up and hide this feature from his customers. When **Allow domain admin to change trunks** is set to **No**, domain administrators can see their trunks only in the dial plan and cannot make any changes.

When you activate **Loopback detection**, calls looped endlessly from the TELES.iPBX to the TELES.iPBX be torn down and the call will not be set up.In environments in which a SIP proxy routes calls from one PBX domain to another, you may want to deactivate loopback detection, as it can be beneficiall to allow these calls in this environment.

Some SIP implementations have a bug that interferes with SRTP key proposals. They reject calls although they ought to ignore the keys. Deactivate **Propose secure call** to accept calls from these devices. Bear in mind that all outgoing calls will be insecure when this option is inactive. We recommend that you report the bug to the device manufacturer and upgrade the device's software.

3.1.2 Ports

The TELES.iPBX needs to allocate certain ports on the machine that it is running on.

3.1.2.1 HTTP

The HTTP and HTTPS ports are used for the communication between the built-in web server and the web browser. The HTTP port is used for insecure but lightweight communication; the HTTPS port is used for secure, but somewhat more expensive communication.

By default, the HTTP port is 80, the HTTPS port is 443. If you are running another service on your host or you want additional security, you may change these ports to any other available port.

If you choose a port that is already occupied, please try the other port (HTTP or HTTPS). If it is available, you may change the other port to one that is available. You do not need to restart the process in order to change the ports.

If you cannot reach the system on any port, please use the netstat command to locate the ports that have been allocated by the system.

3.1.2.2 SIP

The SIP ports are used for insecure and secure SIP communications. By default, the system chooses port 5060 for SIP and 5061 for SIPS. The TELES.iPBX opens a UDP port and a TCP port for secure communications.

If you are to set up your DNS records up, set three records (assuming that you are operating the domain **test.com**):

- **sip._udp.test.com** must point to SIP port (UDP)
- **tcp.test.com** must point to the SIP port (TCP)
- **sips._tcp.test.com** must point to the SIPS port (TCP)

You can repeat the setup for every domain that you want to operate on the system.

3.1.2.3 RTP

The RTP ports are used for sending and receiving media. You must specify a reasonable port range so that you have enough ports for all open calls.

Most user agents send RTP media data from the same port where they expect to receive data. This is useful when a user agent sends media from behind NAT. The TELES.iPBX can use this mechanism to establish a two-way media path, even if the user agent cannot determine its public IP address for media and is behind NAT.

Some user agents use different ports for sending and receiving. Although they will not be able to operate behind NAT, they are within the scope of the IETF standards. To be able to be compatible with these devices, the TELES.iPBX has a flag called **Follow RTP**. By default, this flag is set to **on**. If you have trouble with devices that use different ports for sending and receiving, try to turn this flag off. Please note that some of the troublesome devices also have a flag to turn the usage of different ports off.

Please note that you can also control this behavior on the trunk level. If a specific trunk has this problem, use this setting only on the trunk level.

3.1.2.4 SNMP

The simple network management protocol (SNMP) is a widely used protocol for checking what's going on in your network. When you run the TELES.iPBX, you probably also want to see statistics about the usage and get alarms when something goes wrong.

The setup of SNMP on the PBX side consists of the following steps:

Select the port on which the SNMP server is to listen. The default port is 161. If the host runs other SNMP services, you might want to choose another port.

Enter the IP addresses (separated by a space) or the IP address range in the dialog box **SNMP Trusted IP Addresses** to tell the TELES.iPBX from which addresses it is to accept SNMP requests. The IP addresses must be in decimal notation. The TELES.iPBX does not perform DNS address resolution. If you want to specify an address range, use the form Adr/Bits, where bits is a number indicating how many bits of the IP address are to be considered. For example, the string 192.168.2.0/24 matches the addresses 192.168.2.0 to 192.168.2.255.

SNMP-tool setup varies. Because the TELES.iPBX does not offer a standard set of values (such as CPU temperature, disk space etc.), setup is a bit more difficult that the setup of a standard sensor.

A readable parameter is described by its object identifier (OID). Please enter the OIDs in your tool and select appropriate names for them. Also make sure that the IP address of the host running the SNMP tool matches the setup that you gave the TELES.iPBX in the **SNMP Trusted IP Addresses** setting. The TELES.iPBX does not support snmpwalk or other tools that automatically describe the TELES.iPBX's abilities. You must enter these settings manually.

The following table describes possible OIDs. An absolute value describes the current state on the TELES.iPBX. The value might go up and down. Relative values only go up and accumulate.

Table 3-2 OIDs

OID	Description	Absolute	Unit
1.3.6.1.2.1.2.1.1	Call objects	Yes	Calls
1.3.6.1.2.1.2.1.2	Registrations	Yes	Registrations
1.3.6.1.2.1.2.1.3	Messages	Yes	Minutes
1.3.6.1.2.1.2.1.4	Call attempts	No	Calls
1.3.6.1.2.1.2.1.5	Successful calls	No	Calls

Call Objects shows the number of call objects allocated in the TELES.iPBX. Note that usually there are at least two call objects for a regular call, and during call forwarding you might have even more.

Registrations object shows how many extensions are actively registered with the TELES.iPBX. This gives you a good overview on how many active users the system has.

Messages shows how many voicemail messages the system currently has stored. Note that forwarded e-mail messages are not stored on the TELES.iPBX.

Call Attempts calculates all attempted calls.

Successful Calls measures the number of successful calls. The number increases whenever a call is terminated.

Note: Bear in mind that use of SNMP decreases the system's performance level with an increase in traffic.

3.1.2.5 Call Managing Ports

The **Call Managing Port** can provide external tools with information about incoming calls and allows external tools to initiate calls. The port uses a proprietary interface. If you leave this setting empty, the TELES.iPBX will not open the port.

3.1.3 License

Click here to check your license status, request confirmation and configure your certificate.

3.1.3.1 License

Your TELES.iPBX comes with a valid license, so you do not have to enter anything here. If you are having trouble processing registration and calls, check the **Status** window. If **Not licensed** appears in the line **License Status**, please contact TELES support.

3.1.3.2 Request Confirmation

The TELES.iPBX may receive its configuration information from a service provider. Your service provider may provide you with a URL that contains a ready-to-go configuration or a configuration template that you can easily modify. This may simplify and speed up your setup significantly.

Note: This function may overwrite your existing configuration without warning. If you leave the URL empty, the TELES.iPBX will use the default URL.

3.1.3.3 Certificate

Certificates tell your communication partner that you are really the one that you claim to be.

By using a certificate you defend your installation against DNS redirection attacks.

You can provide only one key to the TELES.iPBX. That means for secure communication, you can operate only one domain in a secure way.

In order to provide the key, just enter the ASCII string that you received from the trusted party, copy it into the text field and click **Save**. The TELES.iPBX will then present this certificate to HTTP and SIP connections that require secure communications.

3.2 Domains

Before you can start to use the TELES.iPBX, you must set up at least one domain. By default, the TELES.iPBX will create a domain called **localhost** for you.

A domain is like an email domain. It groups a number of users. These users can call each other without going through a trunk. Additional features, such as call pickup, can be configured and might have additional restrictions. If you can, set up your DNS accordingly, so that users from other domains can find the group by standard DNS name resolution.

You may have several names for a domain (domain alias). One of these names will be the primary domain name. The TELES.iPBX will use that name whenever it has to generate a name for the domain.

The domain that has the name **localhost** (or an alias with that name) has a special function. It will match all requests that cannot be matched to a domain name in the domain list. This makes it possible to run the TELES.iPBX on changing IP addresses without changing the domain name and significantly simplifies the setup of the TELES.iPBX in environments where only one domain is needed.

Domain names may be IP version 4 addresses. Bear in mind that you must be sure that the host is always running on that IP address. This could cause problems if you are assigning IP addresses by DHCP.

You may mix IPv4 names with DNS addresses. You can also rename the domain and reassign the primary domain name.

3.2.1 Create

To create a new domain, you must choose a **Primary Name**. You may pick additional aliases and enter them, separated by spaces, into the **Alias Names** box.

3.2.2 Show List

To see which domains are available on the system, click **Show List** in the navigation bar.

The web interface lists the available primary and alias domain names. If you click the primary domain name, you will be redirected to the domain context. The **Users**

column shows how many accounts (extensions, hunt groups, etc) are used in the domain. Click **Edit** to change the primary and alias domain names.

Click **Delete** to delete the alias for the domain. If the name was the primary name, the system will randomly choose another primary name. If you delete the last name for the domain, the system will delete the domain and all associated data.

3.3 Status

The status information helps the system administrator check the TELES.iPBX's functionality.

3.3.1 System

The system status overview shows the software **Version**. This information is relevant when you want to open a trouble ticket.

The **Working Directory** shows you where the TELES.iPBX's working files are stored.

The **Routing Table** shows the identities the TELES.iPBX uses for outside communication. The TELES.iPBX first checks the interface for an outgoing packet, and then changes it's identity accordingly in the SIP packet. This feature makes it possible to run the TELES.iPBX on hosts that communicate with the public Internet and the private Intranet at the same time without an application layer NAT gateway.

The TELES.iPBX lists IP addresses and netmasks.

3.3.2 Log File

The log file contains a list of the most recent log entries. You can clear or reload the log file using the links ton the page.

To trace a longer context, write the log messages to a file. Set the file name at **Settings | Logging | Log Filename**. The file will be saved in the directory /home/teles/ipbx. Use an FTP program to download the file and use a standard text editor to go through them.

3.3.3 Call Log

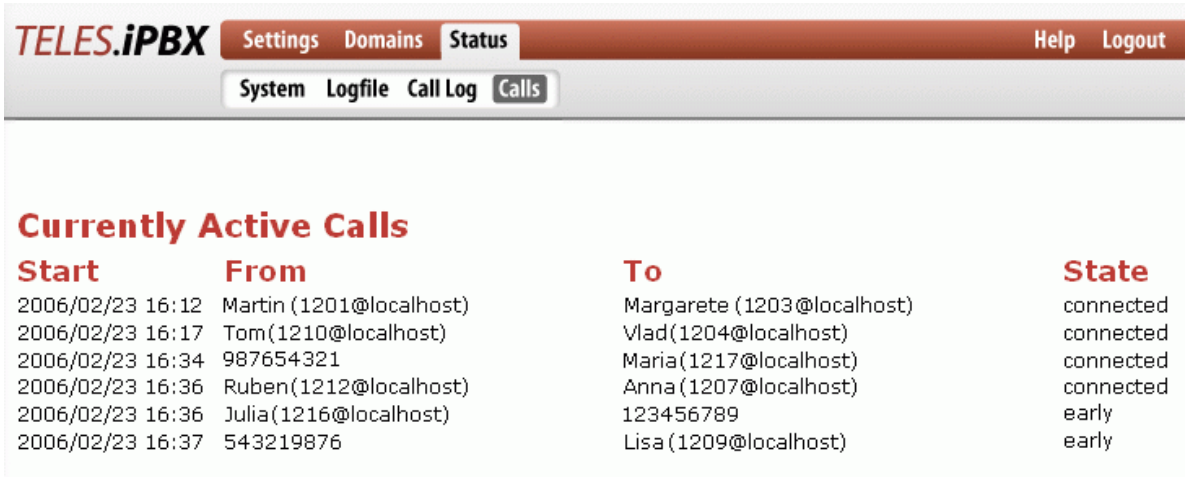
The call log shows the last calls that were made on the system. You will see the start date, the source and destination, the account that will be charged and the duration of the call if the call was successfully connected.

The start time for non-connected calls is the time when the call was initiated. For connected calls, the connection time appears.

The **To** and **From** headers are copied as they are. For calls that run over trunks using registration, the TELES.iPBX will use the identity the trunks in the **From** field. The account that initiated that call will appear in the **Charge** column for these calls.

Note: In the case of call redirect and transfer, the TELES.iPBX will charge the account that initiated the redirect or transfer. Several CDRs will appear in the log; one for the intial call and another one for the transfer or redirect.

3.3.4 Calls



In the **Calls** window, you can see which calls are currently active on the system.

Listed are the call's start time, source, destination and state. Possible states are **early** or **connected**. This view contains only the primary calls. Secondary calls on the other side of the B2BUA are not shown on this interface.

4 Domain Administration

On the domain administration web pages you will see information pertinent to a specific domain. Here the system administrator may delegate administrative tasks to others who cannot change the overall setup. It is also possible to rent a domain to a customer (hosted environment). The limit of number of accounts per domain allows you to give your customers full access to their view on the system.

To get into domain administration mode, either log on as domain administrator or click the link on the domain overview web page. If you are logged in as system administrator, you can fork the session by opening the domain view in another window.

The domain mode contains several top-level entries:

Domain Settings enable you to customize the behavior of the TELES.iPBX in this domain. Here you can define how features are mapped to star codes.

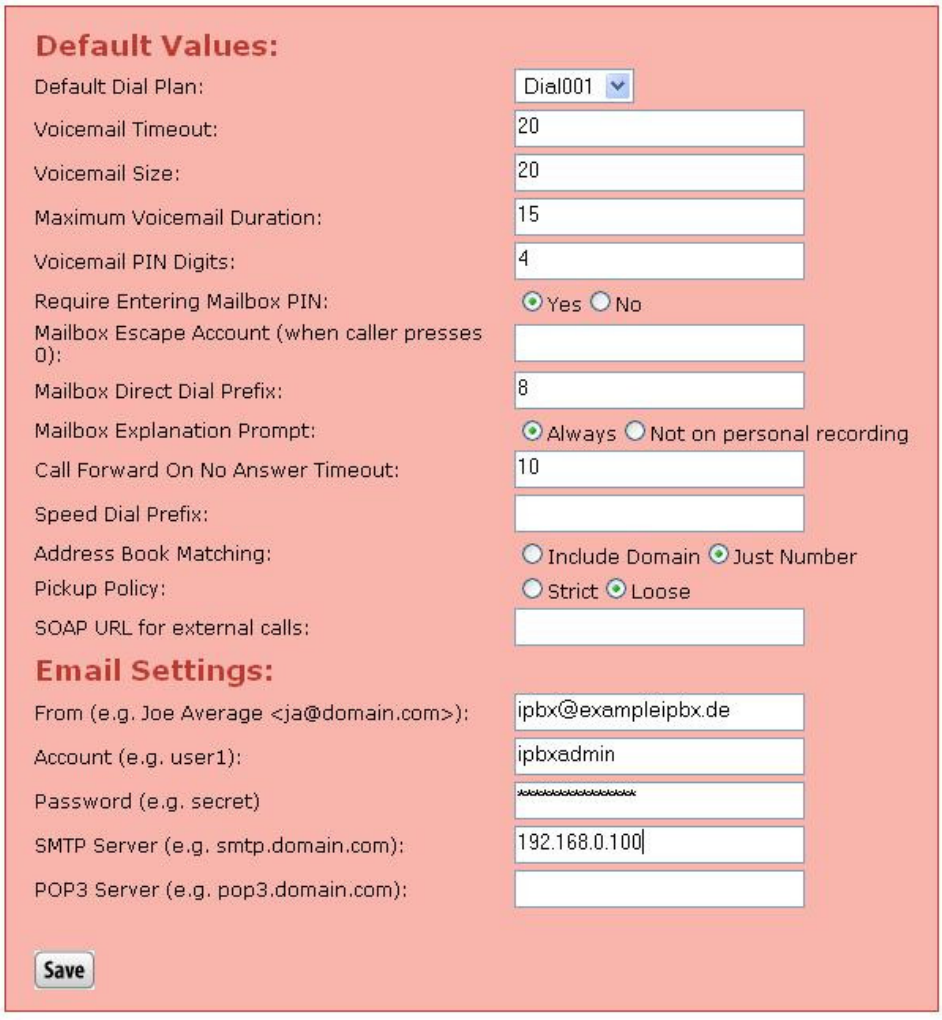
Accounts are anything that you can dial on your TELES.iPBX. Accounts include extensions and auto attendants. These may be service numbers for the TELES.iPBX and/or extension numbers. Extensions are accounts that are assigned to your users. They may include a mailbox and other features, such as do not disturb and redirect.

Trunks are used to connect your TELES.iPBX to the outside world. Trunks can be PSTN gateways in your network or they can be ITSP accounts you have signed up for. The TELES.iPBX offers various generic account types and some special trunks types for the most common Internet telephony service providers.

Dial Plans tell the TELES.iPBX how to reach an outside number. Usually you will use a trunk to terminate outgoing calls, but dial plans may contain more information about the cost of the call. Each extension may have its own dial plan. You can use dial plans to allow or restrict extensions from making calls to specific numbers.

The **Status** is important for you when something is not working as expected, or when you want to trace the TELES.iPBX's activity. You can see call traces, endpoints registered to your TELES.iPBX and currently active calls. You can also access the domain's log file here.

4.1 Domain Settings



The following settings can be configured for the domain:

4.1.1 Default Values

Default Dial Plan: Most of the accounts in a domain will use a defualt dial plan. Here you can specify which dial plan to use for accounts where no special dial plan has been provisioned.

Voicemail Timeout: If you do not specify a value for a user but enable the mailbox, the value entered here defines how long the TELES.iPBX will wait until it redirects the call to the mailbox.

Voicemail Size: Enter the number of messages that can be stored in a voicemail box.

Maximum Voicemail Duration: Enter the maximum time to record a message.

Voicemail PIN Digits: When you create an extension, you can leave the PIN field empty. Then nobody can access the mailbox with a PIN. Only a user registered with the extension credentials can access the mailbox. To allow a user to set up a PIN, tell the TELES.iPBX how many digits a PIN must have.

Require Entering Mailbox PIN: Activate with **Yes** or deactivate with **No**.

Mailbox Escape Account (when caller presses 0): When this option is set, a user that hits the mailbox can press 0 to get to the account that you specify here.

Mailbox Direct Dial Prefix: This setting is used to complete the number when a user dials a Mailbox Number.

Mailbox Explanation Prompt: If you set this prompt, the mailbox will list the caller's options after playing the personal recording. With the standard greetings, the TELES.iPBX will always list the options.

Call Forward On No Answer Timeout: The TELES.iPBX will redirect a call after a timeout. The tells the TELES.iPBX how many seconds to wait before performing the timeout.

Speed Dial Prefix: This setting is used to complete the number when a user dials a speed-dial number.This is necessary in system setups that require a prefix (e.g. 9) for an outside line.

Address Book Matching: if you choose include domain, the system will look in this doamin.

Pickup Policy: The TELES.iPBX will also pick up calls from all other orbits when the pickup policy is set accordingly.

4.1.2 E-Mail Settings

The TELES.iPBX can send e-mail. It uses SMTP (SMTP=Simple Mail Transfer Protocol) and POP3 (POP=Post Office Protocol) to talk to the e-mail server. POP3

is only used for authentication purposes and will not allow the TELES.iPBX to download messages from the e-mail server; it can only send messages. Most operators today offer the usage of ESMTP, or Enhanced SMTP. This protocol includes authentication, so that you do not have to use a POP3 server. Please contact your email-provider to check if these protocols are supported.

The **From** field is copied into the message as the originator of the message. Set a display name and an e-mail address there. Please use angle brackets around the e-mail address, for example `PBX <pbx@test.com>`.

The **Account** identifies the mailbox used for authentication. It is usually the name before the @ sign. If you are using a large web-hosting provider you may have to provide the full name.

Enter your **SMTP Server**. You may use DNS names here. If you enter a colon followed by a port number behind the name, the TELES.iPBX will contact the specified port on that host; otherwise it will use the default port.

The same applies to the **POP3 Server**.

You only have to provide the POP3 field if your SMTP server requires POP3 authentication before it allows sending e-mail.

Since both POP3 and SMTP transport the password unencrypted over the connection to the e-mail-server, pick a password that does not have to be particularly secure.

4.1.3 Feature Codes

The feature codes expand the functionality of the extensions attached to the TELES.iPBX. Callers can enter the defined code on their telephone to perform the functions listed here.

4.1.3.1 Call Park

Extensions may hold or park a call. When a call is on hold, only that extension can pick the call up again; when a call is parked, other extensions may pick up the call. Holding is performed by pushing the hold button on the extension. Most SIP user agents support this feature with a special key or a soft key. Parking a call will redirect the call to a park orbit. Even if you disconnect the extension, the call will stay there until someone picks the call up or the caller disconnects.

Every hunt group and extension has it's own park orbit. The name of the orbit is the same as the name of the account.

Most user agents don't have a special key for parking a call. Most PBX users use star codes that perform the transfer to the park orbit.

In SIP, a user agent must put the call on hold before it can send a star code to park the call. It will then play an announcement that the call has been parked and hang up. The call will remain parked until the call retrieval code is entered.

4.1.3.2 Call Park Retrieve

To retrieve a parked call, the user must enter the code entered in the **Call Park Retrieve** box.

If more than one call is parked, call park retrieve will pick up the first call in the queue.

4.1.3.3 Call Pickup

Call Pickup redirects unanswered calls to the extension at which the code is entered. This enables users to answer calls for each other from their own phones.

Both extensions must be members of the same hunt group.

4.1.3.4 Call Return

Call Return dials the last number that was missed. This function is useful for SIP devices that don't keep a list of missed calls (e.g. ATA). Most SIP devices with a display have this function built-in, and the user may see the caller ID on the display before returning the call.

The call return function stores only one number. When the extension makes a call that gets connected, the call return number is cleared. This ensures that a number is called only once.

4.1.3.5 Redial

Redial calls the last dialed number again. The redial number is never deleted, so users can redial numbers even if the call was connected.

4.1.3.6 Call Forward

The following call-forwarding modes are possible:

All means that the all calls are forwarded.

Busy means that a call is forwarded only if the extension is busy.

No Answer means that no device picked up after a certain timeout. The timeout is a domain setting that can be overwritten by an extension setting.

There are feature star codes to activate and to deactivate each of these modes. When the user dials an activation code, the TELES.iPBX will prompt the user for the redirection number. When the user dials a deactivation code, the user will hear a prompt that the feature has been deactivated.

4.1.3.7 Block CID

By default, the TELES.iPBX will try to provide caller ID on outgoing calls. When a user enters the block CID code, the TELES.iPBX will try to hide the CID on all subsequent calls until the user deactivates the blocking.

Calls from one extension to another extension will always show caller ID.

4.1.3.8 Block Anonymous Calls

When the TELES.iPBX receives a call where caller ID is neither an extension number and does not provide a valid caller ID, it will assume that this is an anonymous caller ID. Caller ID is treated as valid when it consists only of the characters 0-9. It may have a '+' character in the beginning.

By default, the TELES.iPBX will allow anonymous calls. When **Block Anonymous Calls** is enabled, those calls are rejected with a IVR prompt which explains that the caller could not be identified and the user accepts only calls with a valid caller ID.

4.1.3.9 DND

Do Not Disturb (**DND**) is used to temporarily reject all incoming calls for all devices registered with this extension. The two star codes are used to turn DND on and off.

DND also applies to hunt groups. If a member of a hunt group has set its extension number to DND, the hunt group will skip that extension.

Many SIP devices have a dedicated DND button. Most implementations handle DND locally on the device. In this case, the DND applies only to the specific device and not to the extension itself. It usually does not survive reboot cycles.

4.1.3.10 Go To Voicemail

This star code is a quick way to get to the user’s mailbox.

4.1.3.11 Record

In certain situations, you need to record a WAV file. For example, when you want

to load an annoucement into the auto attendant, you need an easy way to generate such a WAV file. If you enter the **Record Message** code, the TELES.iPBX will record your message and send it to you via e-mail. To use this feature, the TELES.iPBX must be able to send emails to your account, which means you must set up the SMTP information and an e-mail address. Do not use this feature for recording memos or other longer messages.

You can also use this code to record the prompt for an auto attendant or an IVR node. In this case, you must specify the account number after the star code (e.g. dial *98123).

4.1.3.12 External Call

In many offices, there is a strict policy regarding outside calls or private calls. If you are not in your office, but want to place a call from an extension, you can place an outside call using your extension identity. When you dial the **External Call** star code, you will be prompted for your extension number and your access code (from the mailbox). After authentication, you may enter the destination number and dial the outside number as you do from your extension number. The call will show up in the call log as if it has been placed from your extension number.

4.1.3.13 Clear Voice Message Indicator

When the user dials this star code, the TELES.iPBX will delete the message waiting indicator (MWI).

4.1.3.14 Send Voicemails

When the TELES.iPBX records a mailbox message, it can store it locally or send it via e-mail to the user. To send a voicemail message via e-mail, you must first properly set up an e-mail address for the user and domain.

4.1.3.15 Customer Originated Trace

This useful feature sends the call details of the last calls to the extemsion’s e-mail account. Instead of writing down the number on a notepad, the user can send herself an e-mail.

The TELES.iPBX will include a link to the last number. When the user clicks this link, the TELES.iPBX will prompt her for her username and password. The user will then enter her username in the form `user@domain`. If her browser supports saving the logon information, the next time she clicks the link to dial the number, she will immediately initiate the call to that destination.

Note: This feature works only with user agents that support the REFER mechanism outside of existing dialogs. Make sure you are familiar with the functionality of the telephones connected to the TELES.iPBX.

4.1.3.16 Call Barge In

This feature allows a third party, e.g. a secretary, to enter into a call between two other parties. Both parties will hear the third party enter the conversation and they will both hear what the third party says.

4.1.3.17 Listen In

This feature functions like Call Barge In, except that the third party will not enter the conversation, but only listen in. The call is not interrupted and the calling parties are not aware of the third party's presence on the line.

4.1.3.18 Teach Mode

This feature allows a third party to be heard by only one party on the line. This is useful in call centers, where a supervisor or teacher may want to communicate with an employee during a transaction, without the customer's awareness. The feature is sometimes referred to as Whisper Mode. This feature requires good echo cancellation.

Since all of the three features listed above severely compromise the privacy of the calls running through the TELES.iPBX, they are only available for specifically defined extensions.The domain or system administrator must enable these features in the extensions' **Permission** tab. Bear in mind that government regulations may restrict use of these features. In addition to ethical questions, illegally listening to telephone conversations is a severe crime in many countries.

4.1.4 Domain Address Book

The domain address book is a simple way to specify address book entries that are shared between the users on the domain.

It is possible to match incoming calls and display text-based caller ID. For example, the domain administrator may add cell-phone numbers to the domain address book, so that employees can see immediately if a mobile user calls into the TELES.iPBX. Speed-dial entries can also be set up.

Address book entries consist of the following fields: The **Name** is used as that entry's display name (for example Joe Average). The **Number** is the digit-only num-

ber of that address book entry. To keep things simple, SIP URL are not supported in the address book. The **Speed Dial** code is the star code dialed to reach the provided number quickly. The name and/or the speed-dial number are optional, the number must be present in the entry. Each number can appear only once in the address book.

Address book entries can be entered manually or in a batch run using CSV files.

4.1.4.1 Creating Single Entries

To create a single entry, set the name, number and star code (if desired) and click **Create**. The new entry will appear in the list on the same web page.

To edit the number, click **Edit** next to the entry. To delete the entry, click **Delete**.

4.1.4.2 Importing Address Books

Comma Seperated Value (CSV)-files are the defacto standard for address books. Almost all tools that manage address books can export their information in the CSV format. You can edit these files with a standard text editor.

The TELES.iPBX expects the address book to appear in three columns containing the name, number and star code. Lines that do not contain a number in the second column are ignored (typically the first line).

A sample CSV file might look like this:

```
Name;Number
John Doe;13224355682
Joe Average;13225646453;*12
Marilyn Monroe;13265456452
Karl Klever;13256676764
```

When you import an address book, the existing entries are not deleted. You might have to check if you have to delete old entries.

4.2 Accounts

Accounts are anything that you can dial locally on the TELES.iPBX. Star codes are not accounts; they change the behavior of the TELES.iPBX.

The most common account type is the extension, but there are other account types, such as conference accounts, hunt groups or agent groups. This chapter will describe how they work and how you can set them up.

4.2.1 Create

To create an account, go to **Domain** mode and click **Create** in the **Accounts** menu.

You must select an **Account Type**. The type can not be changed later.

Next, select a **Dial Plan** for the extension. To use the default dial plan, leave this selection box unchanged.

To assign accounts using an automatic **Plug and Play** mechanism, select either permanent or temporary assignment modes. The permanent assignment mode will wait until a user agent requests a configuration from the TELES.iPBX. If that user agent has no configuration assigned to a specific account, it will search for permanent assignments and remember the user agent's MAC address for this account. The next time the same user agent boots up, it will receive the same extension number and no other user agents will receive that number.

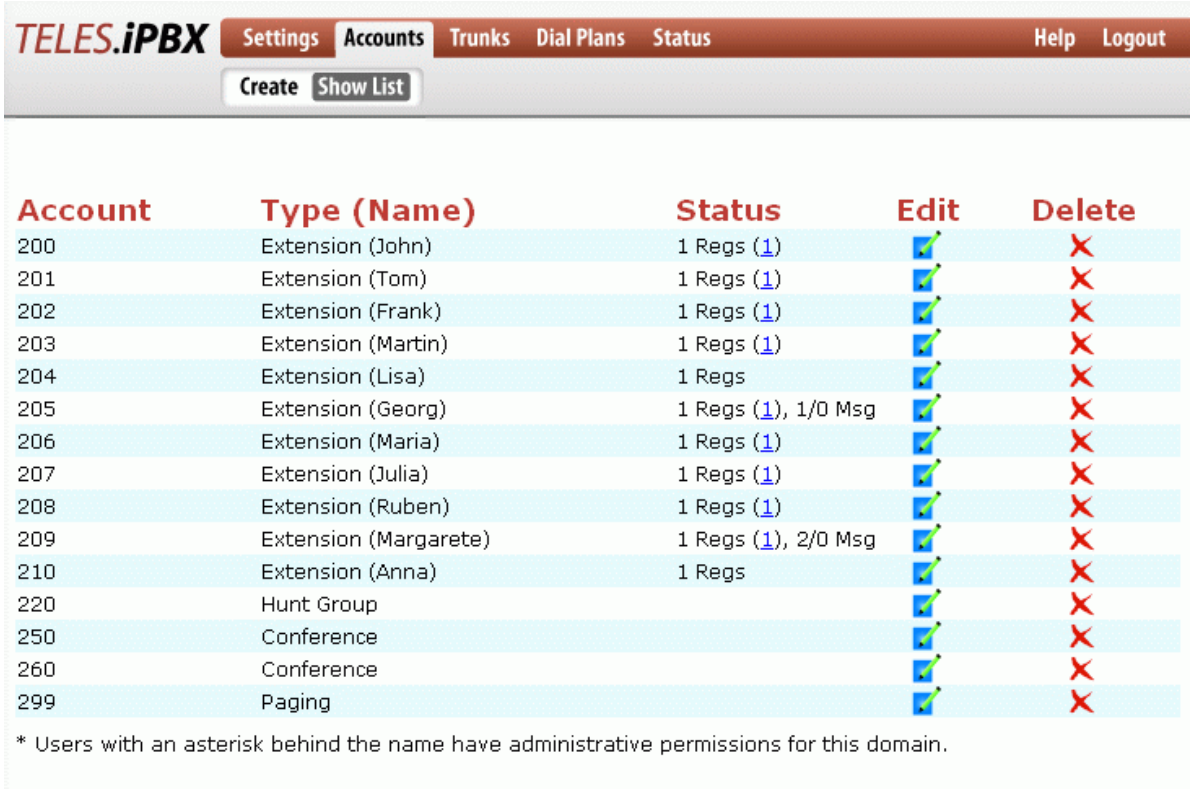
If you select temporary assigment, the TELES.iPBX will look for a free parking slot. An extension is available for plug and play if no other user agent is registered to that extension. It will not remember which extension was assigned to which user agent. The next time the user agent boots up, it might receive another number.

Accounts may have more than one name. One name is the primary name and the other names are aliases. Enter the names in the **Account Names** box. Enter a space between names to set up a separate account for each name. Enter a slash between names to set up one account with various aliases. For example, `123/theo 124/fred` will set up two accounts, the first with the names 123 and theo and the second with the names 124 and fred.

A good username consists of the characters 0-9, a-z and '+', '-', '_' and '.'. If you want to use PSTN-like numbers, use only names with 0-9. However, it does not hurt to create alphanumeric alias names, such as those that appear in e-mail addresses (e.g. `joe.average`). All account names must be lower case. The TELES.iPBX changes input automatically to lower case.

When you select the extension type, you can add up to ten accounts.

4.2.2 Show List



To display a list of accounts, go to **Domain** mode and click **Show List** in the **Accounts** menu. The list shows the name, the type and some status information. Click **Edit** to edit the details of the account. Click the **Delete** button to delete the corresponding account name. If only one name is listed, you will delet the entire account.

If you have several names for an account, it will appear in the list several times. The primary name appears in brackets behind the alias name. An asterisk behind the name means the account has administrative rights for the domain.

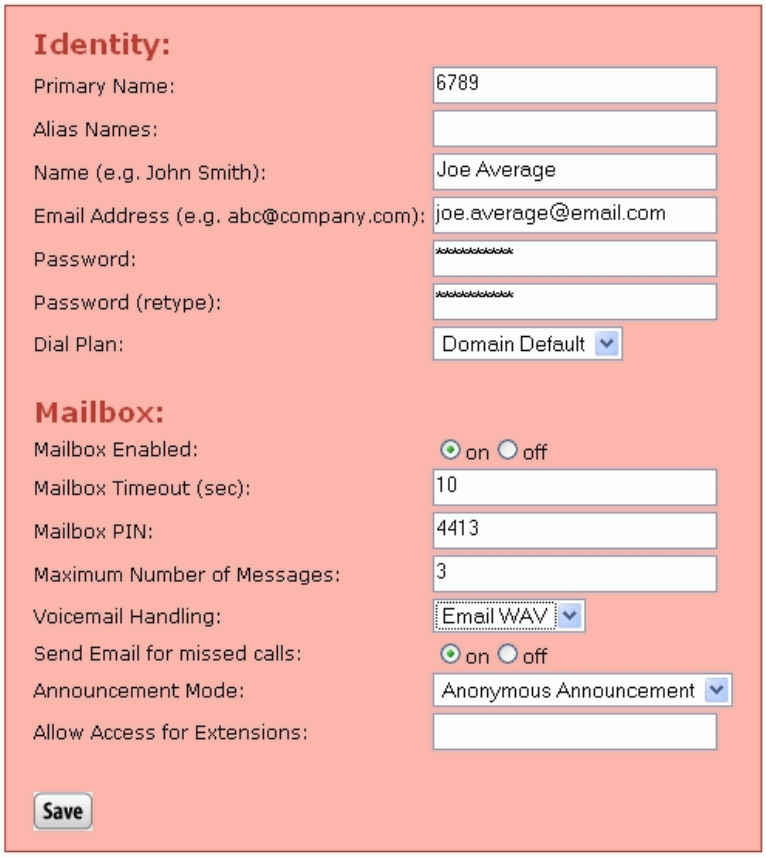
The **Type** column shows the type of the account. If applicable, it will also show the account's extension display name in brackets. On some user agents, you will see a registration link in brackets. This link will take you directly to the user agent's web interface. The **Status** column shows how many registrations are available for that account and if the extension has voice mail.

4.2.3 Extensions

When you click **Edit** in the **Show List** window, the menu bar will show the following links:

4.2.3.1 Edit

Use the **Edit** tab to define the fundamental settings for the account.



You can change the account's **Primary** and **Alias Names**. Use a space to separate alias names. The names must follow the guidelines described in Chapter 4.2.1.

The **Name** will be used whenever the TELES.iPBX creates a canonical representation of the extension, for example when the extension starts a call or when an e-mail is sent to the extension user. Any string is possible.

The **Email Address** is used when the TELES.iPBX wants to send an e-mail to the extension user. This setting must have the form `username@domain`.

The password is used to authenticate the user. When a password is set, the TELES.iPBX will challenge SIP user agents on requests and it will use that password if the user tries to log on to the web interface as domain administrator.

The **Dial Plan** drop-down menu assigns a dial plan to the user. Since dial plans are assigned on a per-user basis, the domain administrator can control the user's rights to place outside calls.

You can enable or disable the user's mailbox using the **Mailbox Enabled** flag. The **Mailbox Timeout** will override the domain settings for the account. The **Mailbox PIN** is used to authenticate the user, e.g. when the user is calling his mailbox from another extension or an outside line. You can use any number of digits for this setting, but we recommend four or five digits.

The **Maximum Number of Messages** will override the domain settings on how many messages can be stored in this mailbox.

Voicemail Handling defines how voicemail is delivered. You can choose between storage on the system (default) and sending via e-mail. If you send the

voicemail messages via e-mail, the messages are not kept on the system. Make a test call to check that e-mail forwarding is working.

Announcement Mode contains the following options: **Anonymous Annoucement** is the default mode if the user has not recorded his name. If the name has been recorded and the user selects the name mode, **Name Annoucement** can be used. **Personal Annoucement** uses a completely customized recording, which may be recorded using the corresponding star code. The annoucement must be in 8 kHz sampling frequency, mono, 16 bits/sample format.

If you want to allow other extensions to use the mailbox, you may list those extensions seperated by a space in the **Allow Access for Extensions** box. This feature makes it possible to set up a group mailbox, for example for a hunt group.

4.2.3.2 Redirection

The **Redirection** tab controls how and when calls get redirected when this extension is called. These settings are also directly accessible to the user through the star code interface of the TELES.iPBX. If the user uses the star code interface, she does not need administrative rights. By changing it on the web interface, the administrator can change the setting for any extension.

The DND and redirection settings are already explained in Chapter 4.1.3.

4.2.3.3 Registrations

The **Registrations** tab is used to control the registrations for that account.

You may register one or more device per extension. When an extension is called, the TELES.iPBX will call all registered extensions simultaneously. The first extension that picks the call up will get the call and the other extensions will receive a cancel message.

If you enter **Trusted IP Addresses**, the TELES.iPBX will only accept registrations from the indicated IP addresses. Separate IP addresses using a space. To indicate subnets, use a slash and the number of significant bits behind it (e.g. 192.168.2.0/24).

To bind this registration to a specific user agent, enter the MAC address in the **Bind to MAC Address** box (e.g. `00c01254f3dc`).

In **Dialog Permissions**, you can enter other accounts that can subscribe to this account.

Below the **Save** button you will see any current registrations for the account. The list shows the registered contact address (as indicated in the registration message), how long the contact has been registered and the registration type. If the registra-

tion type is REGISTER, it is a standard registration for receiving calls. Other registrations are for specific event types, for example message waiting indications.

Sometimes it is useful to clear all registrations. In order to do this, use the link at the bottom of the page. The user agent must also refresh the registration.

4.2.3.4 Permissions

The **Domain Administrator** flag is used to control the extension's permissions. If the flag is set to **on**, the web interface will accept the user's login and allow him to change the domain settings.

For a description of **Call Barge In**, **Listen** and **Teaching**, see Chapters 4.1.3.16, 4.1.3.17 and 4.1.3.18.

4.2.3.5 Instant Message

It is possible to send instant messages to other TELES.iPBX extensions. Enter the recipient's number in the **Destination** box and the message in the **Message** box.

4.2.4 Auto Attendant

The auto attendant asks the caller for the extension number and then redirects the call to the selected account. The auto attendant redirects calls to all kinds of accounts (including conference accounts and hunt groups), but it does not redirect calls to external numbers (trunks).

All calls to extensions go through the auto attendant. When the TELES.iPBX already knows the number, it skips the prompts and goes directly to the phase when the account number is called.

The attendant does not use the SIP redirection mechanism. It starts a new call and passes the media through the TELES.iPBX. This approach has several advantages, for example the caller can cancel the call and try another extension.

Until one of the destinations answers with a ring-back message, the auto attendant plays comfort noise. This emulates the behavior of the old analog system and tells the caller that the call is still active. Upon arrival of the ring-back message, it changes the tone to a ring-back tone.

When calling an extension, the caller can press the star key while the extensions are ringing. In this case, it cancels all calls and prompts for another number.

The logic for handling DND and call forwarding is explained in Chapter 4.1.3.

When the user enters an extension number, the auto attendant has to determine when to try the extension. The following modes are available:

When Extension Matches checks after every digit if the digit sequence matches an existing account. If this is the case, it will call that extension. This mechanism is useful when you use accounts with varying name length, but it might be annoying if the caller tries a non-existing number.

After 1/2/3/4/5 Digit Input will count the number of digits and after the right number has been entered it will try to go to the account that has been entered. If that account does not exist, it will play an annoucement.

The **User Must Hot Pound** mode waits until the user hits the pound sign. This mode is useful in variable-length scenarios, where you explicitly tell the user to terminate the input.

If you turn the **Say Name** setting on, the TELES.iPBX will play an annoucement that repeats the user input, or, if the user recorded the extension name, play back the user name.

The **Accounts that cannot be called** setting lists the accounts that are disabled for redirection. This setting is useful if you want to exclude incoming callers from using conference accounts or to dial VIP numbers. In **Accounts that may record a message** you can enter accounts that are allowed to record a message for the Auto Attendant.

While you may not redirect an outgoing call as a direct destination, the redirect number you specify in **Timeout Handling** can make outgoing calls and will use the dial plan defined as **Dial Plan for outbound calls**.

In **Dialog Permissions** you can indentify other accounts that may subscribe to the account for which the permissions are specified.

To set up the auto attendant prompt, you have two choices. The first choice is to use the **Record** star code (described in Chapter 4.1.3). This is useful when the secretary wants to record her own message or when annoucements change often.

The second choice it to load it onto the system. Please use a standard recording tool to record the message and make sure that you are using 8 kHz sampling frequency, mono 16-bit recording format. This option is useful when you want to a studio recording or you want to use a recording in several accounts.

When the user does not enter any information for a defined amount of time (for example, because there is no DTMF available), you can redirect the call to another account. To do this, specify the time in seconds and the account name in the settings **Redirect Number** and **Timeout**.

You can redirect auto attendant calls to another account depending on the time of day or on other events. This night service is used in conjunction with the service flags (see Chapter 4.2.7). If you want to use the night service feature, set up a service flag and specify where you want to redirect the service during the night.

If you want to offer Dial by Name in the auto attendant, you must enter a pattern that triggers the name search. If you are using a three digit extension code, 411 is a nice example. Of course, this mechanism searches only extensions that have their name set.

There are two parameters that influence the search. You must first specify if you want to search for a first or last name. The first name is the first word of the string that you enter (seperated by a space). The last name is the last word in the string (e.g. "Steve McKenna" would search McKenna, while "Steve Mc Kenna" would search Kenna). The second parameter tells the TELES.iPBX how many digits to read before is starts the search. If there are several matches, the TELES.iPBX will wait for more digits until it has an exact match. The caller may always cancel the search with the star key.

You can also specify direct destinations. When the user enters a key in the 0-9 range, the direct destination feature will act as if the caller had entered the provided extension number.

4.2.5 Conference

The conference account is a very simple conference mixer. It cannot compare to the dedicated conference solutions that support white boarding, video, speaker management and so on. However, you can easily establish conferences with a reasonable number of participants.

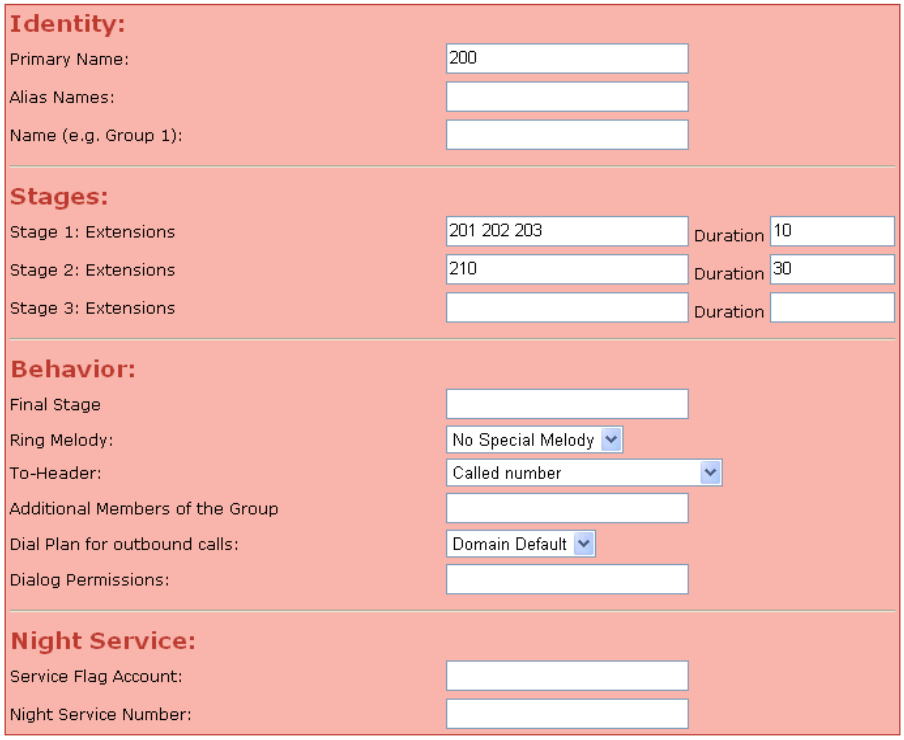
To enter a conference, the user dials the conference account number. The number is also available from a trunk, and the user can go into a conference through the auto attendant.

To bring someone into a conference, the user sets up a call to the participant as a regular call and then blind transfers the call into the conference account.

The conference account offers a PIN as a simple abuse protection mechanism. If you don't set the PIN, anyone can go into the conference room. Otherwise, callers are asked for the PIN before they enter the conference. Conference participants must be informed of the PIN in advance, especially before blind transfers into conferences.

4.2.6 Hunt Group

The hunt group is a simple mechanism to locate a user for a call. The typical case is a central number that is being called in a company where receptionist, secretaries and assistants are on different stages of the hunt group.



The hunt group names can be changed after the creation (see Chapter 4.2.3).

The hunt group supports three stages. On each stage you can list the extensions that are to ring during the stage and set the stage's duration. If you don't need a stage, leave the fields empty.

If no extensions of a stage are to be available, the TELES.iPBX will immediately move to the next stage.

If all stages fail and the **Final Stage** is set, the hunt group will go to this destination. Typically this destination will be an auto attendant that will give the caller the possibility to get someone on the phone.

You may select a **Ring Melody** for the hunt group. Phones that support the SIP Alert-Info header will change their ring tones, so that you can hear by the tone that the hunt group is being called.

Enter a **To-Header** to set this field in the SIP message.

Additional Members of the Group identifies other account extensions that will not ring but are allowed to pick up a call strictly parked in the orbit of the group, or any call directed to the hunt group.

In the **Dial Plan for outbound calls**, the number specified as **Final Stage** can be an outside number dialed using the specified plan.

In **Dialog Permissions**, you can identify other accounts that are allowed to sub-

scribe to the account for which the permissions are specified.

If you use **Night Service**, you must define a **Service Flag** first. The hunt group will check the status of the service flag to determine where to send the call. If the flag is set, the hunt group will redirect the calls directly to the **Night Service Account**.

4.2.7 Service Flag

The **Service Flag** account type is used to indicate a condition to the TELES.iPBX, for example if a hunt group or an auto attendant are to be active or not (night service).

The **Display Name** is used only on the web interface and serves as a comment on the service flag's purpose.

Extensions that may change status lists the accounts that may change the status of the service flag, seperated by space. You may use wildcard patterns here, for example 9* allows all extensions that start with a 9 to change the status of the service flag. If you leave this setting empty, all accounts may change the flag's status.

In **Manual** mode, the flag will change its state whenever you call the account. You will hear a short tone that indicates the account's status.

In **Day/Night** mode, the code's status will change automatically. At the **Day Start** time, the TELES.iPBX will automatically set the account to **Clear**, and at **Day End** it will automatically set it to **Set**. This behavior takes place only on the selected days.

In **Day/Night** mode, the service flag can called to override the status. For example, when the secretary comes in early, she may turn the night flag off manually.

The user can subscribe to the service-flag state. On some VoIP phones, the LED status can be set depending on the service flag. For example, this flag can be useful to show the group members if someone turned the night service on or off.

4.2.8 Paging

In certain situations you may want to start an announcement to a specific phone or to a group.

If you call this number, it will ring the indicated extension with a SIP header that tells the phone to pick the call up immediately. Note that not all SIP phones support this feature. On those phones it will appear as a regular call.

If you do not have a phone that supports dialing a number when pushing a key and hanging up when releasing this key (push to talk), you can dial the **Paging** exten-

sion number and start talking to the group.

The Paging extension has the following settings: **Called Extensions** lists the extensions that will be called, **Calling Extensions** lists the extensions that may call the paging number. If you leave this setting empty, it will revert to the list of called extensions. You can also use wildcards, for example a star, to allow everyone to call the paging group.

The **Display Name** is used as the originator of the calls to the extensions. You can enter a name like PA to show the extensions that an announcement is being played.

Please be careful with the paging group size. The TELES.iPBX must initiate a call to all of the listed extensions, and this may take significant CPU and bandwidth resources. Paging is not limited to the local area network; all extensions that are connected to the TELES.iPBX can be paged, no matter where they are located.

4.2.9 Agent Group

When there is heavy traffic to a specific number, you may use an **Agent Group** to queue the incoming calls and dispatch them automatically to a list of agents.

Within one agent group, there may be at most one call in ringback state. All other calls are queued until the ringing call gets connected and at least one agent becomes available. The agent group keeps track of which extensions are busy and which agents are available. When an agent becomes available, the TELES.iPBX automatically takes the next waiting call out of the queue, rings the agent and puts the call in ring-back state. The mechanism can be seen as a primitive automatic call distributor, useful for small teams that have to process a large number of calls, e.g. sales or support teams.

The **Agent Group** may consist of any number of agents. The agents must be extensions and must be listed (seperated by space) in the **Agents** setting. You may also leave this field empty. In this case, you must manually pull the waiting callers out of the queue, for example by calling the call pickup star code.

The **Ring Melody** specifies what melody should be used when a call comes in for this agent group. You can specify your own URL for the ring melody. In this case, please make sure that the used SIP endpoints support this feature.

If a caller leaves a queue, this is no guarantee that the call will be connected. For example, the selected agent is not available or has another call already on the phone (for whatever reason). To resolve these situations, you may specify a **Redirection timeout** (in seconds) and a **Redirection target**. The target may be any dialable number according to the group's dial plan. The TELES.iPBX will then redirect the call to the provided number. As with all other accounts, you may list

extensions that may subscribe to the group's status in the **Dialog Permissions** field (if you leave this field empty, all accounts may subscribe).

When callers are in the queue, they hear music on hold mixed with announcements. The TELES.iPBX reduces the volume before playing an announcement and increases when it is finished. To record an annoucement, just dial the recording code followed by another star and the annoucement number. For your convenience, you will find these codes at the bottom of the account page. You may specify **Accounts that may record announcements**. If you leave this field is empty, all extensions will have this permission. You may record up to ten announcements.

The announcement number 0 is always played when a caller enters the queue, regardless of the number of callers waiting in the queue (welcome message). The other announcements 1-9 are played in a round-robin fashion. **Gap between announcements** tells the TELES.iPBX how many seconds the PBX should wait between the announcements. **Agent recovery time** refers to the number of seconds that transpire between an agents received calls.

With **User Input Handling**, when a caller is in the queue, she may leave the queue and move to another destination by pressing a key. You must specify the destination to enable this feature.

The **Agent Group** may use the night service feature or the auto attendant (see Chapter 4.2.4).

When an agent does not want to receive calls, she should call the DND star code. It is not a good idea to use the local DND button on the phone, because the TELES.iPBX will then try to send the call to the agent and put the call into the ringing state.

The web interface has a **Queue Status** tab that lists the callers in the queue. This list is refreshed every ten seconds. If you use an external SOAP server, you may also receive notifications when the queue status changes or when an agent in the queue becomes available. This way you can implement your own logic that, for example, does skill-based routing or other routing mechanisms.

4.2.10 Calling Card

By default the TELES.iPBX controls who is allowed to make external trunks via the dial plan. However, if you are running a calling card business or might have extended requirements on placing outgoing calls, you might want to introduce another step using external application server support based on SOAP.

There are three steps for controlling external calls via SOAP:

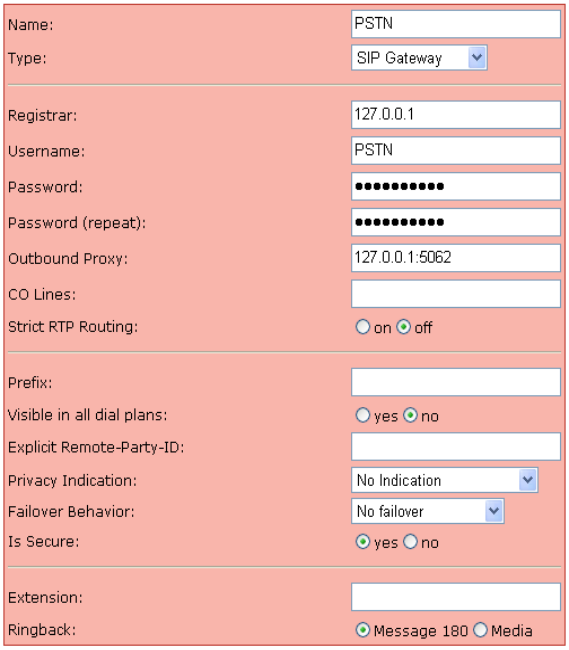
- User authentication

- Call destination and duration detection
- Call logging after termination

With authentication a caller must enter the extension (calling card) number before placing a call. This number is used to get the PIN code for the account and detect if it is a valid account. If the call comes from a registered extension of the TELES.iPBX, this step is skipped. The TELES.iPBX demands caller authentication using the SIP password.

4.3 Trunks

The following trunk types are used to receive or terminate calls to devices that are not registered with the TELES.iPBX:



Registrations. The TELES.iPBX registers itself somewhere else like an extension. This model is used when you have an account with an Internet Service Provider and you use this account for terminating your traffic. In this model, the TELES.iPBX uses the registration number as caller ID, regardless what extension is actually using the trunk.

Gateway. The gateway model does not register; it just sends the traffic to the destination. In this model, the TELES.iPBX uses the its own caller ID to indicate the extension that initiates an outgoing call (if that extension did not turn block caller-ID on). This model is used with customer premises PSTN gateway hardware.

Proxy. The proxy model is similar to the gateway model. The difference is the way anonymous calls are made and how the proxy represents its own domain. As the name suggests, the proxy model assumes that you are talking to a SIP proxy, while the gateway model assumes that you are talking to a SIP user agent.

To create a trunk, go to the **Trunks** list page. At the bottom you will find a dialog where you can create a new trunk. You may choose a descriptive name for the trunk like `My ITSP`. There are no alias names possible for the trunk name. Choose the trunk type when you create the trunk. After creating the trunk you will see the trunk in the list.

The list shows the available trunk names. If you want to delete a trunk, click **De-**

lete and all trunk data will be lost. Click the **Edit** button to set up the trunk's details.

4.3.1 Gateway

Gateway trunks have two settings. The outbound proxy defines where the TELES.iPBX will send the requests. This name can be a DNS name or an IP address. If you use DNS, the TELES.iPBX will use the RFC3263 address resolution scheme to locate the gateway's final address. Examples include `192.168.1.2`, `sip:192.168.1.2`, `test.com`, `sip:test.com` or `sip:test.com;transport=tcp` or `sip:test.com:5062;transport=tls`. You may include parameters according to the SIP standard as you wish. The TELES.iPBX will use the transport parameter. Transport layers UDP, TCP and TLS are supported. If you include a port number, the TELES.iPBX will automatically use the UDP transport layer (see RFC3263).

The **Registrar** setting is copied into the **From** header. If you leave this field empty, the TELES.iPBX will use the primary domain name. This setting must not contain a scheme and it must not contain parameters. However, you may include a port number in the registrar setting. Valid examples are `192.168.1.2`, `192.168.1.2:5062`, `test.com` or `test.com:5060`.

The **Username** and the **Password** are used for authentication purposes. Some registrars use a different username for authentication; therefore the TELES.iPBX includes this field as well. The password must be entered twice.

If you use the **Prefix** header, the TELES.iPBX will put that string in front of the **From** username. This setting is useful when you must present the complete global number. For example, if your extension number is 123 and your global number is +3354334535123, your prefix would be +3354334535.

CO-Lines is a list of names that are used to identify calls on the system.They are used to emulate the behaviour of CO lines known from the old PBX. It may still be of interest which calls are active between the TELES.iPBX and the outside world. Therefore, the TELES.iPBX emulates the behavior of the TDM-based PBX. CO-lines are associated with trunks. Each trunk may have several CO-lines.

If the **Visible** is set in all dial plans, the trunk will be visible in the dial plans of all domains. If it is not set, it will only be available in the domain's trunk. This feature can be used in environments with several domains to share trunks for outgoing calls.

The **Explicit Remote-Party-ID** setting is inserted into the Remote-Party-ID header on outgoin calls. With this setting you can indicate which caller ID is to be

presented on outgoing calls over this trunk.

The **Is Secure** flag is used to indicate that outgoing calls on this trunk can be treated as secure calls. Incoming calls with the SIP's scheme ask the TELES.iPBX to ensure that the call is kept secure end-to-end.

The **Strict RTP Routing** flag can be used to make the TELES.iPBX strictly RTP/SDP compliant for this trunk. Some outside equipment cannot use the same port for sending and receiving media. If you trunk to such equipment, you may need to activate this flag.

The **Ringback** feature was introduced to deal with network operators that obviously cannot handle early media, such as a trunk to ISDN. The 180 Message simplifies signaling in forked calls scenarios, but it means additional delay when the called party picks the handset up and the first samples in the conversion are not transported. When the trunk receives an error code, it can send the call back to the dial plan and continue the matching process. This is useful when this trunk is a trial to place the call, for example when several PSTN gateways are available for terminating the call and one gateway does not accept any more calls. Another example is when you first try to route the call via a peer-to-peer call using ENUM or other location methods, and a connection fallback to PSTN does not result.

The following options are possible:

- **Never failover** (default). The caller will receive the error code as the result of the call attempt.
- **On all error codes**. All error codes will trigger the failover process. Note that call redirect will also be treated as an error code, as the redirection destination can easily be abused to route calls though expensive routes.
- **Only 5xx error codes**. This will trigger failover only when a 5xx or 6xx class error code is received. PSTN gateways typically return 5xx class error codes when all channels are in use. This mode allows you to switch to the next PSTN gateway only in this case. A caller busy will not trigger the failover.

4.3.2 Proxy

The proxy mode is quite similar to the gateway mode, with the following differences. First, the anonymous call uses the string `<sip:anonymous@anonymous.invalid>` (while the gateway model puts an `anonymous` only in the user part and keeps the domain). The proxy model never changes the domain name, it always uses the primary domain name of the used domain.

4.3.3 Registration

The registration option causes the TELES.iPBX to behave like a SIP user agent that wants to register.

For a description of the following parameters, please refer to Chapter 4.3.1: Username, Password, Outbound Proxy, CO Lines, Strict RTP Routing, Prefix, Visible in all dial plans, Explicit Remote-Party-ID, Failover Behavior, Is Secure, Extension, Ringback.

If you are behind a firewall, enter an IP address for a **STUN Server** to cross the firewall. The STUN-server request will refresh in intervals of the number of seconds entered in **Keepalive Time**.

The **Display Name**, **Account** and **Registrar** are used to construct the address that the TELES.iPBX registers. As in the gateway model, the registrar may contain a port number. The account must be a valid SIP account identifier and the display name is used for display purposes.

For example, the display name could be `Test Account`, the account `test-account` and the registrar `test.com`. The TELES.iPBX would register `"Test Account" <sip:test-account@test.com>`.

The **Username** and the **Password** are used for authentication purposes. Some registrars use a different username for authentication; therefore the TELES.iPBX includes this field as well. The password must be entered twice,.

The outbound proxy has the same function as in the gateway mode.

The **Extension** setting is used for incoming calls. If the setting is a account number, the TELES.iPBX will redirect incoming calls to this account. Any type is possible (e.g. an extension, an auto attendant, a conference server, a hunt group or whatever account type is available).

If the extension is an extended regular expression in the form `<delimiter> <pattern> <delimiter> <replacement> <delimiter>` (for example, `![0-9]{7}([0-9]{3})!\1!`), the system will match the user part of the request URI to the pattern and use the replacement to find the account number. Using this method, you can take parts of the provided number to identify the account. In the example, from a ten-digit number the last three digits are used for locating the account. For more information about extended regular expressions, see Chapter 4.4.

If you use the extended regular expression in the form of the extension setting, you have two more parameters. The third parameter may be a `t`, which takes the information out of the **To** header instead of the Request-URI (which would be the `u` flag). The fourth parameter denotes the default extension, if expression matching does not result in an existing account number.

4.4 Dial Plan

Each domain may have zero, one or more dial plans. Dial plans are used when an extension dials a number that is not available on the local TELES.iPBX. You can assign the dial plan per extension. This allows you to assign different permissions to the extensions. For example, you might want to have a local dial plan that handles only local calls and an international dial plan with permission to make international calls.

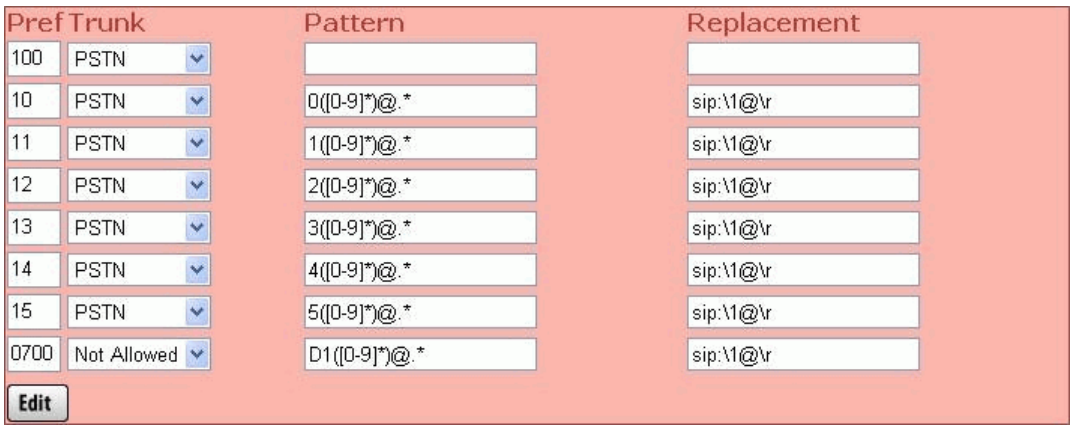
Dial plans are not used to control the TELES.iPBX. For this purpose, each domain has a list of star codes.

4.4.1 Create Dial Plan

To create a dial plan, enter the name in the creation box in the **Show List** window for the dial plans. The name may be any descriptive name; you may include spaces and capital letters.

The list shows the available dial plans. If you want to delete a dial plan, click the **Delete** symbol and all dial plan data will be lost. Click the **Edit** button to set up the dial plan's details.

4.4.2 Edit Dial Plan



The dial plan consists of four components:

The preference is used to sort the dial plan entries. When the TELES.iPBX searches a matching entry in the dial plan, it will take the entry with the lowest preference value. You may use the same preference value for several entries; in this case the TELES.iPBX will pick one of the entries for you.

The **Trunk** setting defines which trunk is used for the call.

The **Pattern** setting is matched against the destination of the call. See Chapter 4.4.3 and Chapter 4.4.4 for a description of the matching algorithm.

The replacement is used in the **To** header, as well as in the Request-URI.

4.4.3 Regular Expression Matching

The regular expression matching algorithm is a very flexible algorithm that follows the NAPTR algorithm of RFC2915. For an exact description, please refer to this document.

The dial plan's pattern string is surrounded by a ^ and a $ (to make sure that the whole string is matched). The TELES.iPBX uses the username and the hostname. The port number, parameters and scheme are not included for the comparison.

If there is a match, the TELES.iPBX will generate the resulting destination from the replacement string. The string may include references to matching groups in the pattern string. These matches are referred by the group number (starting with 1). Additionally, the matching string `r` may be used to insert the registrar name.

The example in the Chapter 4.4.5 will make the algorithms more understandable.

To delete a dial-plan entry, just clear the pattern and the replacement and click the **Edit** button.

4.4.4 Simplified Matching

In most cases, you will not need extended regular expressions. You can use simplified patterns instead. The following patterns are allowed:

Literals. If you want to match a specific number (e.g. 911), just put that number there. The literal will be the first match in the expression.

Prefixes. Enter a prefix a star behind it. For example, "9*" would match all numbers that start with a 9. The prefix will not be part of the match, only the string matched by the * will be the match of the first expression.

If you use simplified expression, you do not have to specify a replacement. The TELES.iPBX will automatically enter `sip:\1@\r;user=phone` as the replacement.

4.4.5 Example

A typical example is the string `([0-9]*)@.*` as pattern and `sip:\1@\r;user=phone` as the replacement. The pattern string has one group `[0-9]*`, which is referred to in the replacement string as `\1`. If the pattern is matched against the value `2121234567@test.com`, it will store `2121234567` in the first group and the result will be `sip:2121234567@test.com;user=phone` (`user=phone` indicates the

recipient that the number is a telephone number).

4.5 Status

The status for the domain is similar to the status of the whole TELES.iPBX. The only difference is that the lists filter the information by domain.

5 Setup Checklist

Use the following checklist to help you set up quickly and easily.

- **Define Port**. If you don't want to use the standard ports, change the ports during the first startup. Check whether you can set up your DNS so that the user agents can locate the TELES.iPBX through a DNS lookup.
- **Create Domain**. If you have set up DNS, name the domain accordingly. Choose IP addresses only as alias names. Even if you don't have access to DNS it is a good idea to give a domain a "real" name.
- **Create Extensions**. You can set the names, dial plans and the other details later when everything is up and running. Register some user agents and make some calls between them.
- **Create Trunks**. Without trunks, you cannot set up a dial plan.
- **Create Dial Plans**. After you create the trunks you can create dial plans. Determine which dial plans you will need to serve your domain.
- **Create Other Accounts**. Now you can create other accounts, such as auto attendants and conference accounts. You can configure the accounts right after creating them.
- **Detail Extension Configuration**. When you are almost done, take some time to fill out account e-mail addresses and display names. You can also work on the group assignments for call pickup and so on.
- **Change the Administrator Password**. Set an administrator password when everything is running. Log on as system administrator and change the password.

