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CASE STUDY :: DEPLOYING SKYPE and PRETTY MAY FOR A VIRTUALLY COST FREE OFFICE PHONE SYSTEM

PHONE BILLS REDUCED BY \$6,000 FIRST YEAR
ONGOING COST FOR 10 LINES \$66 PER YEAR COMPLETE
COMPLETE NOTES ON SUCCESSFUL DEPLOYMENT

EXECUTIVE SUMMARY

Technology Investment:	\$1,300 for Central Hardware/Software \$20 per telephone seat
Ongoing Cost:	\$66 per year + International Calling Cost
Limitations:	30 concurrent lines maximum Required Windows Server
Technology:	Skype VoIP Pretty May Call Center for Skype Skype Headsets/Phones Broadband Internet Connection Battery Backup System

Regardless of the immediate cost reduction, Northwest and any other entity using 30 or less lines concurrently, can operate an efficient phone distribution, PBX, and call center for \$66 per year to include all calls to US and Canada with a technology investment of \$1,000, a Broadband connection, and an average of \$20 per telephone seat. There is no loss in audio quality. This system includes all of the bells and whistles like Music on Hold, email distribution of voice mails, SMS cell phone notifications, Out Calling, Call Routing, Call Hunt, Dial By Name, and Personalized Voice Prompts and cues.

Fixed and other operational costs are reviewed annually by the Northwest staff as part of the MAVECA Non-Profit Management System. During the 2006 review, it was noted that telephone and communication costs for world-wide Campus Management were significantly less than like costs for inter-US communications. World-wide communications were being handled via Skype Technologies—a fast growing Voice Over Internet Protocol (VoIP). Skype computer-to-computer calls were free consistently

with their slogan "The Whole World Talks for Free." Calls to and from world-wide landlines and cellphones ranged from 1 to 20 cents per minute. The world-wide communications also was using a Skype Dedicated Phone Number purchased for \$36 per year allowing landline and cellphone users world wide to call into the US-based church.

The US based communications were using AT&T, one of the comparable big five landline providers, to manage 4 lines, long distance, and local calls. As well, a Partner Small Business Phone Distribution System was used to connect internal extensions, provide voice mail services, and other standard PBX features. The average monthly phone bill was \$400 with PBX service and maintenance fees averaging another \$100 per month. The 2006 US-based communications expense exceeded \$6,000.

The staff looked at several options such as Vonage, C-Beyond, and other VoIP providers as well as attempted to negotiate contract and cost reductions with AT&T and its competitors. After looking at the standard options for US-based communications, the staff began to research using Skype Technologies and related third party products to meet its communication needs.

The estimated annual cost appeared to be \$60 but the staff could not find any fully deployed Skype office or organization. The initial testing of equipment, lines and Skype began in 2007. The entire system was successfully deployed by December 31, 2007. Northwest saw an immediate savings of \$4,700 and a cost reduction of \$6,000 in 2008.

CURRENT STATUS

Northwest Church maintains one main telephone number, 20 ministry extensions, and 10 concurrent lines for a second year cost of \$66.

Using a fully featured PBX and auto-attendant system, outside callers are not aware of the Skype deployment. Audio quality has remained consistent while call center and PBX features have increased. After full deployment, little or no maintenance has been necessary.

Pretty May software upgrades are free and have been installed with no problems over the course of the last 18 months.

Skype Service has been set up to automatically pay using a credit card and to automatically recharge international call funds at \$10 minimum.

BASIC DEPLOYMENT

Pretty May Call Center (PMCC) settings are intuitive, simple, and easily understood using their Online Help and FAQ system. The settings are handled primarily through a simple graphical interface which develops a simple call flow chart. The user can easily add extension, voice menus, prompts, and voice information nodes to the chart. In Phase One testing the system was up and running with 10 extensions, directions to the church, and voicemail in 20 minutes. However, several setting reworks were done before full deployment. Though not fully discussing the "how tos" of all settings (see prettymay.net FAQ), the following sections intends to give an ordered development cycle and to illustrate that cycle as it evolved in the deployment of Skype and PMCC.

Northwest chose to use PMCC to route incoming and outgoing calls while using the standard Skype infrastructure to handle all interoffice communications. Outgoing calls are handled by the PMCC Outgoing Call Center that gives access to one of the concurrent lines and allows many employees to

dial out through the one main Skype account for the price of \$36 per year to the US and Canada. When calling office to office, employees simply select the other employee from their Skype Contact List to call. This keeps the PMCC bandwidth free for incoming and outgoing calls.

HARDWARE SETUP

Skype will run almost any computer though Skype Video (not applicable to a PMCC Deployment) is limited on slower machines with slower internet connections.

PMCC, however, has certain system requirements that must be taken into consideration. These requirements are detailed at www.prettymay.net. Northwest's deployment required some specific and successful technology applications to meet the needs of the ministry.

FAST SERVER

To provide for growth in line usage, Northwest chose an advanced dual core Xeon processor and 4 gigabytes of memory. This upgrade allows for fast Skype handling and for adequate voice prompt processing. Several tests provided lower voice quality, stutters and delays with four or more concurrent line usages or heavy auto-attendant use.

The server provides the speed, bus, and structure for providing excellent processing power. PMCC and Skype were solely deployed on this server with no other applications running. The only downsides to the server that were found during testing and deployment are noted under Battery Backup and Audio Card.

BATTERY BACKUP

Pretty May runs under the Windows Operating environment and is set by default to initialize upon login of the user under which the installation was completed. In a non-multi-user, insecure, or non-networking environment, this environment provides adequate restart after a power outage. The computer BIOS can be set to restart the computer after power is restored and PMCC will be fully functional.

However, in a secure environment, with one or more users, or running Windows Server versions, PMCC will not be able to restart until the user logs into the operating system. PMCC does not currently run as a service or background program.

The workaround for this process is to secure battery backup for the computer, router and modem which are used to run PMCC. Northwest selected enough backup for two hours as it is rare for an Atlanta outage to reach more than one hour. This backup prevents a needed restart after frequent small outages and the unknown failure of the system if outages occur during non-working hours; it also provides for phone service during outages.

AUDIO CARD

During the process of testing and deployment it was noted that Skype will not function without a sound device installed and standard server configurations not to include an audio card. A simple USB phone was used during Phase One Testing but analysis indicated that regardless of PMCC and Skype settings it was not the processing power of the server or the software settings that were producing low and slow audio quality—it was Windows using the USB phone driver for audio processing.

PMCC developers had encountered this problem before and recommended a soft-solution Virtual Cable. Virtual Cable acts as a software audio card providing the processing and connecting of one application to another without cables or hardware. In this case, Windows was connected to Skype and Skype to

PMCC. However, Virtual Cable consistently stopped processing and required restarts over long periods of testing and, as a result, Skype would not function and would cascade to a failure for PMCC to manage and distribute calls.

Phase Three Testing resulted in the installation of a \$40 sound card that immediately provided consistency and excellent sound quality with no delays.

SKYPE SETUP

Skype must be installed and signed on under the organizations primary Skype username prior to installing PMCC on that same computer. Specific system requirements for PMCC list the most recent version of Skype that PMCC can support.

As well, Skype must be installed on every "extension" computer, that is, on every computer that employees will use for communications whether in the main office or at home for virtual offices.

Northwest set up the Skype Account as northwest.church to be user friendly and has been very satisfied with the choice. After installation, testing, and deployment, Northwest has become very Skype connected and any other Skype User can look up and contact to Northwest Church by simply remembering northwest.church instead of a complicated name or phone number.

The Skype account was originally set up with voice mail services but those became unnecessary after full deployment as did features such as call forwarding and mobile use. With PMCC answering the primary line of northwest.church, Skype never handles any back-office operations such as voice mail.

In First and Second Phase testing, Northwest simply forwarded calls to the receptionist's Skype account, but during Third Phase testing, Northwest setup a secondary Skype account— northwest.backoffice. The reason for this addition of a second corporate account relates to how PMCC uses Skype to set up a PBX system.

PMCC answers the call for the primary Skype Account and then routes that call (based on Call Flow— see below) to a contact previously stored in a primary Skype Account Contact list. (For more on Contact Lists see Main Skype Account Setup.) In normal use, there is only one Skype User per computer and Northwest desired incoming callers to be able to get to a receptionist immediately and the reception desk is not always manned by the same people. Rather than create a complicated phone routing group, Northwest set up PMCC to always send calls to northwest.backoffice which is always signed on at the reception area computer. Reception personnel can change without having any downtime due to logging in or out of Skype. As well, reception personnel can sign into their personal Skype account on a second computer and remain directly available to the staff via Skype.

The purchase of a SkypeIn phone number (\$30 per year with the \$36 service plan) is important as part of the Main Skype Account setup. Without this number, outside callers will not be able to connect to PMCC or to your office. Phone numbers are available with your area code.

PMCC is able to route calls based on Caller ID and on the phone number dialed to call in. Organizations wishing to route calls with different departments based on the phone number dialed will need to purchase more than one Skype Number for the Main Account. Multiple numbers need to be purchased for the Main Account as PMCC will only answer on Skype Account.

In the Skype architecture, all numbers purchased for a single Skype account will route to that username.

MAIN SKYPE ACCOUNT SETUP

Skype users, via the Skype Program, use a contact list to make calls. Calls can be dialed that are not on the contact list but the list acts as a common location for "speed dialing." Landlines, cells, and Skype user names can be put into the contact list and dialed.

Prior to setup of PMCC, all employee Skype Accounts (extension accounts in PMCC) should be added to the Main Skype Account for the organization. In this manner, all employee accounts will be available for call routing in PMCC. Skype has simple instructions for adding contacts to the list.

SKYPE SETTINGS

Through all three phases of testing, Northwest worked closely with Skype and PMCC to determine the optimal settings for the Main Skype Account. Skype allows users to determine setup options that not only affect Skype's operation in the Operating System but also Skype's interaction with PMCC. The following settings were found to be critical to smooth operation, efficient audio processing, and interaction.

- Allow calls and SkypeIn Calls from anyone. This allows outsiders to use the Main Skype Account as a normal phone number.
- Disable Video
- Ensure that Skype is set to use the Default Audio Device under Audio and that the checkbox, "Allow Skype to adjust volume" is checked. Also, ensure in Windows that the Sound Card is set to be the default audio device (Control Panel, Sounds, Audio).
- Mute all sounds under Sounds under Audio Settings to allow faster audio processing.
- Uncheck "Accept Chats from anyone" and set to "Don't Accept Chats from Anyone".
- Uncheck all boxes which allow for notices, messages, tips, or announcements. These will simply begin to clutter the system task bar, and since no operator sits at the PMCC computer, these messages will never be seen.
- Uncheck "Automatically Update Skype" and all related options. Northwest found during Second Phase testing that Skype auto-updated to a version that PMCC was not yet ready to support. PMCC will announce when it is ready to support new versions of Skype. As well, new Skype updates are not always "clean" and often resetting the options of the Main Skype Account as well as all lines that were added is required.
- After PMCC installation, under Skype Options, Advanced, Manage other Programs Use of Skype (bottom of dialog), set "Allow PMCC to use Skype."

EXTENSION SKYPE ACCOUNT SETUP

Northwest has deployed Skype and PMCC through the main campus and on off-site and portable computers that are used by personnel. This setup allows for virtual offices and for total flexibility in work locations. While on campus, personnel sign into Skype with their username and receive calls at work. While on the road, they can forward their Skype account to cell phones, have PMCC forward to their cells, or they can sign into Skype at distant locations.

These personal Skype accounts, set up by each employee, are added to the Main Skype Account's Contact List. Likewise, the Main Account and other employee's usernames should be added to each

personal Skype contact list. This allows employees to call directly using Skype—computer to computer—outside of the PMCC system.

SKYPE RECHARGE

Using Skype's Web Interface, Northwest signed in and set Skype to "auto-recharge" its account with funds so that the monthly subscription (\$3) for unlimited calling would be available as well as funds for international calling. The minimum account balance before recharge was set to equal the cost of the annual telephone number registration charge so as to ensure prompt payment and not to lose the main phone number.

PMCC SETUP

PMCC downloads quickly and installs quickly and seamlessly. During the First and Second Phase of testing, Northwest added all ten lines (the number of incoming/outgoing lines that PMCC will set up for use by one Main Skype Account ranges from 1-30) as part of the setup process. This method worked well but if any changes were necessary to Skype as a result of installation. All 10 instances of Skype had to be updated. During the Third Phase of testing and final deployment, only one line was specified to be created during setup.

PMCC will establish itself as a self-starting program, come online, open all necessary Skype windows, and begin answering calls when Windows logs in (see Battery Backup for more information on auto-starting PMCC). Users need to have their Skype username and password for the Main Skype Account available during PMCC installation.

All testing indicated completion of the following steps in the order presented for the cleanest, most economical installation of PMCC:

TELEPHONE DIRECTORY

PMCC includes an internal telephone directory, when maintained, serves as a building block for the rest of the setup process. When developing call flows, voice mail settings, and SMS messaging, the telephone directory acts as a master file retaining settings for each individual added to it. The source for individuals in the Telephone Directory is the Main Skype Account Contact List.

As each individual is added, their voicemail, SMS and other settings should be set up.

MAIN SETTINGS

From the Menu Bar of PMCC there is an option for "Settings." These settings are global in nature and affect the entire PMCC system. The settings are well documented by PMCC at their website as well as with interactive pop-ups from the setup screens.

Northwest primarily used the default settings on the "General" tab, changing only the delay between answering and beginning recorded messages and providing Music On Hold when calls were transferred outside of PMCC to cell phones and landlines.

Northwest used simple audio programs to customize musical selections for Music on Hold providing voice over and announcements. The main settings allowed for PMCC to be pointed to this mp3 file.

The settings for voice prompt audio files are found in these main settings pages. The default system voice can be reviewed and new recordings made and converted from these screens. Northwest customized all recordings heard by outside parties using the pastor as the voice that handed them off

to the automated system. One of the most frequently made compliments by guests to PMCC is that their guide through the automated system is the pastor.

The recording of these system-wide prompts took less than 15 minutes using the PMCC interface.

CALL ROUTING

One of the most accessible features of PMCC was to set the routing of calls to use Hunt Groups that included any contact in the Main Skype Account Contact List. This feature allowed a call to be transferred to a user's Skype, telephone, or mobile phone; thus, the call literally follows the user around the world.

Also, as a smaller organization, this feature allowed for automatic backup of the northwest.backoffice Skype account in case of unexpected absence at the reception area. If a call was missed, that call began to flow to other offices (physical and virtual) until someone was able to answer it.

CALL FLOW DEVELOPMENT

PMCC uses a modified flowchart to add extensions, menus, voice prompts and pre-recorded messages. Customizing the settings is quick and simple. For example, adding a voice menu with three options is as simple as right clicking somewhere in the main call flow and choosing "Add Node." From the add screen, the voice prompts for the menu can be recorded. A right click on that Node adds extensions or voice recordings (directions, etc.) for each of the numerical options in the menu.

Also, nodes can distribute a call through a group list until someone is found to answer the call. As always, extensions and people are added from the Telephone Directory and Main Skype Account Contact List.

Northwest refined its call flow during each of the testing phases and then developed timed call flows for open and close times as well as special events. Northwest's primary goal was to have calls answered promptly and personally; therefore, the call list was kept very horizontal without many levels of call flow options. A person can be reached with one to three keystrokes depending on caller choices.

CALL SCHEDULE DEVELOPMENT

During the Third Phase of testing and in Deployment, Northwest instituted multiple Call Flows using PMCC Call Flow Scheduling. Northwest instituted an Open Reception Hours flow and a Closed flow with different welcome messages. As well, during the Open Times, the flow was adapted to dead end a call to the Receptionist without requiring any keystrokes.

Entire call flows can be copied, adapted, saved, and scheduled allowing great flexibility in call routing and AutoAttendant options.

LINE ADDITION

Prior to Phase Three testing, Northwest allowed PMCC to set up all 10 desired lines during PMCC installation. During Phase Three testing, Northwest successfully completed a much more efficient setup. As PMCC was installed and configured, only one line was established.

After all Skype and PMCC settings were complete, Northwest used the Line Management tab in the main PMCC window to add the other 9 lines it desired. In this way, PMCC was clear as to the primary line and most of the Skype settings were inherited into the 9 additional lines.

Windows is able to run any program under any user account even while another user is logged into Windows. This advanced feature is not known by many end users but it is critical to the manner in which PMCC routes calls and manages concurrent lines in Skype.

Skype allows one Skype user to sign on per Windows session. PMCC creates a new user account on the Windows Machine for each additional line that is requested (PMCC User #2, PMCC User #3, etc.) and then runs an additional instance of Skype under each added user while remaining in the original Windows session. In this manner, PMCC has ten instances of Skype lines or 10 lines that it can route calls in and out of. Each instance of Skype inherits the settings of the master account, and therefore, it is the most efficient way to make sure all settings are completed before adding additional lines.

OUTCALLING

An individual listed in the PMCC Telephone Directory can call Skype from any Skype Account or phone number listed in the Directory and be allowed to access an outside line. As well, when a listed user Skypes PMCC (calls computer to computer) or calls PMCC, he/she is able access all voicemails.

Outcalling can limit the use of international and other types of calling as well as require passwords. Northwest does not implement passwords since this feature adds one more step to outcalling and was an annoyance during Phase One testing.

VOICEMAIL

Northwest implemented SMS notification and Email Voicemail Forwarding to provide an efficient system. Users of text messaging receive an immediate notification when they have a voicemail and voicemails are immediately forwarded to the user's email address as .wav or .mp3 files.

SMS notification can be set to follow on or off hours so the messages do not arrive during sleep or other off hours.

Northwest users help eliminate unnecessary waiting by callers when the users cannot answer the phone or are not present by utilizing Skype Status changes. Skype allows a user to change their "online" status, and PMCC has a main option setting that manages the way that PMCC reacts to a user's Skype Status. Northwest has set PMCC to not route calls to "Do Not Disturb" or "Offline" statuses. These calls go immediately to voicemail. "Do Not Disturb" is used by the staff during meetings and other off hours.

WEAKNESSES

Most of the weaknesses of Skype and Pretty May Call Center when used for a small office were resolved during testing. Northwest did not fully deploy PMCC and Skype as a total office communication solution until critical weaknesses were resolved. PMCC staff were more than open to PMCC modifications. Skype is much less responsive and several issues important to Northwest have been on their development schedule for years prior to Northwest's use. The few weaknesses that remain are:

PBX ONHOLD FEATURE

If a call is routed to a user and that user is on the phone, PMCC puts the user into a Call Queue for 2 minutes before taking a voicemail. This procedure is standard in the Call Center industry and would work for a PBX/reception application if the user could put the current call on hold and get a call out of queue. PMCC does not currently allow this option and, thus, the receptionist has to finish the existing call before getting the next call out of queue.

PMCC has committed to address this issue but no action has been taken.

DISABLING THE QUEUE

Many end users, especially those that are not in customer service, don not want to or need to utilize the queue feature of PMCC. However, there is no way to disable the queue. If PMCC has an active call with a user and another call needs to be routed to that user, PMCC will put the call in queue instead of going to voicemail immediately.

SKYPE AND MAC TRANSFER

Skype for Mac does not allow an end user to transfer a call once it is successfully routed to them. Skype for Windows allows the user to simply type an extension number (established in the PMCC Telephone Directory) to automatically transfer a call. This numeric dialing option—keypad—is listed on the Skype for Mac call window (call windows show when a Skype call is in progress), but it shows as a disabled feature.

This problem has been reported over the last 18 months to Skype by many users and Skype has yet to correct it.

SKYPE VOICEMAIL ON FAILURE

Upon any failure of PMCC, the Main Skype Account will be handled by the normal Skype technology. If there is a voicemail or away message set up with Skype, users will hear or use this system.

PMCC INTERFACE GRAPHIC DIAGRAM

The Call Flow Diagram is unwieldy though not unusable. The canvas is sized too large and requires unfriendly scrolling for small charts. There is no zoom capability for larger call flows.