220 Lab C  
PBX Programming I

Pre-Lab Activities:
None

Purpose of the experiment:
The goal of this lab is to give you a feel for making MACs. You won’t become a Siemens expert just yet, but you’ll understand the process in broad terms. The scenario is that you are assigned to establish telephone service for a two-person work group. You will take two hours to figure out – with the help of the manual – what an experienced administrator would do in 5 minutes; that is called learning.

Note: You will work on a functioning PBX. Plan what you are doing and double-check your data entries. On the other hand, note that a mistake won’t upset thousands of users, so don’t be too timid, either!

Smoking and any food or drinks are not permitted in the Applications Lab!

Equipment:

PBXs are complex, versatile pieces of equipment. Consider:

They can serve many different types of users in many ways. The phones in the company cafeteria and on the company president’s office are used very differently. Chances are the cafeteria phone can’t make long distance or international calls. The president gets a fancy, expensive phone while the cafeteria gets plain, inexpensive.

They are designed to be expandable. Small companies almost universally hope to become big companies and have no desire to replace the entire phone system when they hire the 20th or 200th employee. On the other hand, they don’t want to buy a system that can serve a small town for a 6-person operation.

They have to adapt to constant small-scale changes. Employees are hired, fired, promoted, transferred. Departments move, merge, split, grow. All of these activities affect the phone system. The common term for this kind of frequent reconfiguration is “Moves, Adds, and Changes” or MAC.

One of the prices of this versatility is complexity. The computer system at the core of the PBX has to be told how it is configured. Every feature added to a new PBX design requires the user to choose whether and when to use it and adds to the task of configuring the system.

The Siemens switch is configured by sending commands from an ordinary PC. The PC runs the terminal software that comes with MS Windows.

You have access to the relevant sections of the Siemens manual (you have less than 100 pages from a CD ROM on which the basic configuration manual alone measures 1000 pages). Refer to this manual prior to each step. The CREATE command you will use several times will requires a number of parameters; use the manual to figure out what every parameter means. When possible, the system will offer you default values.

The PBX commands are not intuitive or easy to work with. The command language of the PBX lacks any of the user-friendly features we have become used to in the PC world. Take your time, and ask questions where you can’t figure things out. This stuff is designed for trained technicians, not casual users.
Taking Data

At the end of these instructions, you will find a sheet with several labeled sections. Use this sheet to record data as you take measurements. The lab instructor must initial the data sheet before you leave the lab. You must include the initialed data sheet with you lab report to receive full credit.

Steps to be Performed:

The Scenario (not really steps, but read through this carefully before you go on)

Remember, for most companies telecom is a means to an end, not an end in itself. The telecom solution must be fitted to a business problem.

You will install two phones into a work area where customer support for a small technology company is being performed. Currently, customer support consists of a Senior Technician, and a Technician. Both answer customer calls. The volume of calls is still small.

The calls come to the Technician first. If he cannot answer the question, he will transfer the call to the Senior Technician. The Senior Technician gets calls from engineers in the company as they assist in solving problems. When either the Technician or the Senior Technician are on their phones, calls for either one of them need to go to a third number, which must also ring on the Technician’s phone. The Technician can then answer this call (possibly after placing his own call on hold).

- The Technician will have extension number 5299.
- The Senior Technician will have extension number 5199.
- The third number will be 5399.
- The Senior Technician will get a standard analog 2500 set, attached to port 042113.
- The Technician will use a digital phone, a “ROLM-Phone 400”, that has access to both 5299 and 5399; this phone will be on PBX port 041504.

Notes:

- The ports are referred to as “XXYYZZ” in all command prompts. This means shelf XX, card YY, port ZZ. You should stroll over to the Siemens and look inside. The system can be expanded by adding cards as needed.
- The Siemens, like most large PBXs, supports both analog and digital phones. The digital phones have lots of nice capabilities, but cost more.
- Where the manual makes a distinction, note that our Siemens is a Model 50.
- You will need to log into the PBX with User Name “Student” and password “lab115”
- All of your work will be done in the configuration sub-system. After you log into the PBX, type “CNFG” to get into the sub-system; the system will prompt you with “Command”.

Examine the layout of the PBX

One of the instructors will show you the inside of the actual switch; once you are back at you lab station:

- Use the command LIST MAP ALL to get a list of all interface cards (you don’t have to copy it from the screen).
- You only need the ones in shelf 4.
  - Make a list of the different card types you see, and use the manual, sections 3.1 and 3.2, to identify the cards.
  - List the slot numbers that contain RLI and ATI cards.

Install the single-line phone:

Go to section 8.4 of the manual.
- Create (CREATE EXTEN) the extension 5199 for a single line phone, class of service 0, leave all the forwarding information blank, set the ACD field to N, and enter SR Tech for the name.
- Create the Single Line Interface for the senior technician. Use section 8.2 of the manual (CREATE SLI), you are setting up a single line phone, DTMF, no flash-phone, use the default for the ACD field.
• Check that you have dial tone on your new phone. Call 2129 and check the display to see the name and number display.

Install the Electronic Set (ROLM Phone 400)

Go to the manual section 8.8
• Use LIST BUTTON 400 1 to list the button assignments for the ROLM Phone 400, Table 1 (the default). Note that the display shows 5 columns corresponding to the 5 columns of buttons on the phone (the two buttons between 35 & 36 are the volume up and volume down buttons).
• With these instructions you also printed a template for the faceplate of the phone; use this to label the buttons based on what you see on the screen.
• Use the table starting on page 8-31 to identify all the feature buttons. You might want to place a copy of the labeled printout where you can refer to it in the remainder of the lab.
• Create extensions 5299 and 5399, the same way as you created 5199. Pick appropriate names for these extensions.
• Refer to section 8.11 (CREATE RP) and activate the ROLM Phone on 041504. Use the type RP400, no data option, table 1, set the Speaker option to yes, set extension 1 to 5299 and extension 3 to 5399.
• Test that you can call from 5299 and 5399 and that you can receive calls on both extensions.

Test calls and proper call forwarding on busy and no answer
• Make a call from 5199 (to any phone) and then call 5199 from another phone while the first call is still in progress. You should get a busy signal, which is not what you want.
• Test 5299 the same way.
• Go back to section 8.4 and figure out how to set up both 5199 and 5299 to forward to 5399 on busy and “no answer”. All of your calls are “Internal”. Test to see that the setup now works correctly.
• Forward 5399 to 2129 using the “FORWARD” button you identified earlier (push the correct line button, then Forward, then the number to forward to).
• Call from 5299 to 5599; with that call active call from 5199 to 5299; where does the call end up, and why?
• Un-forward 5399 (push the line button, then Forward, then the line button).
• Forward 5299 to 2129.
• Call from 5299 to 5599. With the call active, call from 5199 to 5299. Where does this call end up and why?
Requirements for your lab report

General Rules

Your report must be typed, except that drawings may be made by hand. While your raw data sheet must be attached, all relevant data must be copied into your typed report. **Do not** put things like "see data sheet" into your typed report.

Things to put into your lab report

A header section with your name, your teammates’ names, group number, and date/time of the lab.

The initialed raw data sheet (always attach this at the end of the report)

Each of the subsections below requires a brief description of what you measured, your results, and – when requested – a reference to and a quote from a reference source that you can compare your measurement to (for example, one of our readings or an internet source).

- Show the list of interface card types in shelf 4.
- What slots have RLI and ATI cards?
- Show the commands and command parameters needed to set up the single line phone, be specific about all parameter choices you made.
- Show the button layout of the RP400
- Show the commands and command parameters needed to set up the RP400, be specific and show all parameter choices you made.
- Show the commands and command parameters to set up call forwarding (in the command line interface), in a way that would make sense to a lay person.
- Throughout the lab you tried test calls at various points. Describe each of these test results, including
  - The call you made
  - The result
  - Why did you get the result above given the configuration the PBX was in at that point
  - Include specifically
    - A call before call forwarding was in effect
    - A call after forwarding was set up in the command line
    - A call after the FORWARD button was used on the ROLM Phone
Name: ___________________________________________

Group:  __________________     __________________     __________________

Group Number:  _________  Date/Time:  ________________

Interface cards in shelf 4

Input to create 5199

Input to create the Single Line Interface

Test call results from 5199
Buttons on the ROLM Phone 400 (Table 1)

Use the separate template sheet.

Input to create and configure the ROLM Phone

Call Tests