RDC - Remote Desktop to your NBER PC.

Background

NBER staff can access their NBER desktop computer from a remote location. Because the Remote Desktop protocol can be set in an unencrypted fashion, we have blocked such connections at NBER's firewall. The method to connect to your NBER PC is via a secure shell (SSH) tunnel, which will route(tunnel) all communication between your remote(home) PC your NBER Desktop PC via the "ssh" protocol through a server at NBER.

Schematically:

Your Remote/Home PC Device Port 3391 Ssh server Port 22 Your NBER Desktop Port 3389

This setup is a three part set up. The first part is a one-time setup. The other two are to make the Remote Desktop connection.

What information you would need for the setup?

- a) Your NBER Desktop's hostname or IP address. For the most part the NBER IT will supply you with this information. There is a general convention that we follow which is based on Floor, and Office Room Number or proximity to it. As an example: 3rdflnear316.staff.nber.org will mean On the 3rd floor, and near Office Number 316. If it is Office 316 itself, the hostname would be 3rdfl316.staff.nber.org. If for any reason this is not known, or not given to you, you can find this out by going to the section, "Finding my NBER PC's IP address" later in this document.
- b) The NBER PC needs to remain ON at all times, and Remote Desktop to this PC needs to be allowed at all times. We have pushed out centralized policies that take care of both of these, but for some reason your PC doesn't appear to have these settings, please go to the section, "NBER PC's Allow RDP and Power Setting" later in this document.
- c) An ssh client. There are many ssh clients, and some of you have used different ones, but we will describe only PuTTy here, as this is a single precompiled downloadable program that doesn't need additional installation. You can download PuTTy

64 bit version: <u>https://the.earth.li/~sgtatham/putty/latest/w64/putty.exe</u> 32 bit version : <u>https://the.earth.li/~sgtatham/putty/latest/w32/putty.exe</u>

Most computer are now on 64-bit architecture. So please try that first.

Setup Part 1: SSH tunnel (One time setup)

Now we are operating on your remote PC (your home computer).

Assuming that you downloaded PuTTy (which can either be in your "Downloads" folder, or your Documents" folder), you can double click on it to start it up. If you desire for it to show up on your Desktop screen, you can copy the putty.exe file from Downloads folder to your Desktop folder.

Double click on the Putty Icon



You will see the following pop up.



First click on the + to the left of SSH to expand options within SSH as indicated above.



Click on the "Tunnel" as indicated below:

🕵 PuTTY Configuratio	n			>	×			
Category:								
Features	^	Options	controlling SSH p	ort forwarding				
🚊 Window		Port forwarding						
Appearance		Local ports a	ccent connections	from other hosts				
Behaviour		Bemote ports	Remote ports do the same (SSH-2 only)					
Iranslation		Eonwarded ports						
Celeuro		rorwarded porta	•	Remove				
Data								
Proxy								
Telnet		Add new forwar	ded port:					
Rlogin		Source port		Add				
SSH		Destination						
Kex		Desunation						
- Host keys		Local	O Remote	O Dynamic				
Cipher		Auto	○ IPv4	O IPv6				
H. Auth								
¥11								
Tunnels								
Bugs								
More bugs	~							
About			Open	Cancel				

You will see the following in the right section of the PuTTY screen as below:

You will notice that the box in the middle as indicated above is empty.

Make the following entries.

- a) Box to the right of Source port : 3391
- b) Box to the right of Destination: YOUR NBER PC's HOSTNAME.staff.nber.org:3389
 The HOSTNAME is the one noted down in a) of "What information would you need for the setup?"

Leave the button on "Local" and "Auto" as is.

See below for details:

🕵 PuTTY Configuration				×
Category:				
Features	Options	controlling SSH po	ort forwarding	
Appearance Behaviour Translation Selection	Port forwarding Local ports a Remote ports Forwarded ports	ccept connections do the same (SSF	from other hosts I-2 only) Remove	
Colours ⊡-Connection Data Proxy	Add new forward	led port:	4	
	Source port	3391 3rdflnear316.sta	Add	
Host keys Cipher ⊕Auth	 Local Auto 	○ Remote ○ IPv4	O Dynamic IPv6	
TTY X11 Tunnels Bugs More bugs ↓				
About		Open	Cancel	

Click on "Add" as pointed in the orange arrow above. You will see the box in the middle filled thus:

Use the scroll bar as show in the blue arrow above to move to the top. Click on "Session" under the categories (left part). The center menu under PuTTy also changes. You will see entries for "Host Name (or IP Address), and Saved sessions etc.

Here we are going to enter an NBER linux server hostname. As mentioned at the beginning (under Background), we are tunneling from your home PC via an NBER server to your NBER PC. This is the section for the NBER server.

🕵 PuTTY Configuration		×	NEW: Use tunnel.nber.org
Category:			instead of nber5.nber.org
Session	Basic options for your PuTTY session Specify the destination you want to connect to Host Name (or IP address) Port Inber5.nber.org 22		
Features ⊡ Window	Connection type: ○ Raw ○ Telnet ○ Rlogin ● SSH ○ Seri	al	
Appearance Behaviour Translation Selection	Load, save or delete a stored session Saved Sessions RDP-to-NBERPC-via-nber5		
Colours ⊡. Connection Data	Default Settings age4.nber.org client2b.nber.org Save		
Proxy Telnet Rlogin	mohan.nber.org nber2.nber.org nber7.nber.org - Rstudio		
⊡ SSH	Close window on exit: Always Never Only on clean exit		
About	Open Cancel		

A special server has been set up for tunnel and is named tunnel.nber.org. Please choose this as the hostname. As a backup, you can use any of nber servers (nber0.nber.org ... nber9.nber.org). In this example, we choose tunnel.nber.org as shown in the first green arrow in the above picture. Next, in the box below "Saved session" enter anything you want Putty to remember these settings by. In our example we wrote: "RDP-to-NBERPC-via-nber5" as depicted in the 2nd green arrow. Finally, click on save as shown in the orange arrow.

Once you have saved this, the settings will remain and will be retained for future use as well. So these instructions are for **"one time"** setup only. You can now close your PuTTY screen.

Part 2: Remote Desktop

Now we are ready to login to your NBER Desktop. This is a 2 step process.

Step 1: Login to the ssh session to start the tunnel. Start PuTTY again by double clicking on the putty.exe or the Putty desktop icon.



In the center of the screen, you will see the name you gave for this saved session. Double click on it.

🕵 PuTTY Configuration	×
Category:	
Session Logging Terminal Keyboard Bell Features Window Appearance Behaviour Translation Selection Coloure	Basic options for your PuTTY session Specify the destination you want to connect to Host Name (or IP address) Port 22 Connection type: Raw Telnet Raw Telnet Serial Load, save or delete a stored session Saved Sessions
Colours ⊡ ·· Connection ··· Data ··· Proxy ··· Telnet ··· Rlogin ⊕ · SSH	Default Settings RDP-to-NBERPC-via-nber5 age4.nber.org client2b.nber.org mohan.nber.org nber2.nber.org nber7.nber.org - Rstudio
About	Close window on exit: Always Never Only on clean exit

A new PuTTY ssh session window will open as below:



The first time you use this, PuTTy will ask whether you want to save server's(in our example nber5's) host key, and you want to answer "OK" to this. Use your nber server username (your NBER email account **sans @nber.org** part in the **"login as:"** prompt and hit enter. You will be prompted for your password. Enter your password. Please note that you will **not see the password you type on the screen, nor will you see the cursor moving.** This is normal, but your password is being entered.

Once you login, you will get a screen as below. Of course it will have your username instead:

lt is sorte	org - P d by n: T	uTTY load	l averag r 12 16	e and fre :31:24 ED	e memory T 2020	
Hostname	1C	CPU ORES	Load Ave(W)	Memory Total	Memory Used	Memory Free
sasl		4	0.0601	66GB	2GB	64GB
nber5	I	12	0.124	66GB	3GB	63GB
nber8		12	0.163	66GB	22GB	44GB
nber4		12	0.376	264GB	197GB	67GB
nberl		12	0.384	66GB	7GB	58GB
nber7		32	0.597	528GB	256GB	272GB
nber9		16	0.766	132GB	8GB	124GB
nber2		16	0.781	132GB	24GB	108GB
nber0		16	0.796	264GB	45GB	219GB
nber3		32	0.811	2101GB	291GB	1810GB
nber6		12	0.979	396GB	22GB	374GB

Minimize this PuTTy ssh session by clicking as pointed in the orange arrow above. Note: Please do not close the session. The ssh tunnel via PuTTy is a prerquisite to connect via Remote Desktop.

Step 2: Remote Desktop login.

Click on Start Menu at bottom left. Type the words "remote desktop" you will see:

ecycle	Bi 🛃	nber5.nber.org - PuTTY			2000			×			
	AI	l Apps Documents Settings	Web	More 🔻					ନ୍ଦ		
ortiCli	Best	match									
>. \	-	Remote Desktop Connection				A.	<				
e obaXt	Setti	ings			Remot	te Desktop	Conne	ection			•
	><	Remote Desktop settings	>			App					
	Ĩŧ	Remote Desktop sleep settings	>								
putty	Îŧ	Remote Desktop Developer Settings	>	Ľ	Open						
	Ϊŧ	Remote Desktop hibernation settings	>	Rece	ent	-					
oMaci	Îŧ	Allow remote connections to this computer	>	•	ion.acct.nber.org	9					
e	Ϊŧ	Require Network Level Authentication for Remote Desktop	>	**	psaweb.acct.nbe	g er.org					
Aicros Edge	ж	Nearby sharing settings	>	₹.	fcoi.nber.org						
	Sear	ch the web		*	sunsys.acct.nber	.org					
01010 01101 01110	Q	remote - See web results	>	~	sql.acct.nber.org	J					
ent2b_				~	inforad.acct.nbe	r.org					X
					localhost:3392	g					
	Q	remote Desktop Connection		0		9 😼			2	e	Lee

Choose Remote Desktop Connection which will take you to:

퉣 Remote	Nemote Desktop Connection —						
	Remote Desktop Connection						
Computer:	Example: computer.fabrikam.com						
User name:	None specified						
The compute name.	er name field is blank. Enter a full remote computer						
Show O	Options Connect	Help)				

In the box for Computer enter localhost:3391 (no spaces between localhost, colon or 3391).

nemote Desktop Co	onnection	_		×
Remot	e Desktop			
Computer: localhost:	3391	~		
Username: STAFF\rsh	annon			
You will be asked for cred	lentials when you cor	nnect.		
Show Options		Connect	He	lp

If you are using this for the first time, the User name: will not be entered, or will by your home PC's username. Click on Show Options, and you will see the below figure.

퉣 Remo	ote Desktop Co	nnection		_		×
L ,	Remot Conn	e Desk ectio	top n			
General	Display Local	Resources	Experience	Advanced		
- Logon s	settings					_
	Enter the nar	me of the rer	note computer			
-	Computer:	localhost	.3391		~	
	compater.	localitoat			-	
	User name:	STAFF\is	hapiro			
	You will be a	sked for cre	dentials when	you connect.		
	Allow me	to save cred	lentials			
Connec	tion settings					
	Save the cur saved conne	rent connec ction.	tion settings to	an RDP file	or open a	
	Save		Save As	0	pen	
A Lide (Ontinen			Connect		

 $\label{eq:constraint} \mbox{Enter the username STAFF} \mbox{Your Username} \mbox{ and click save. This will save it for future sessions.}$

Click on Connect.

It will prompt you for your windows password, as below.

- # -	nemote Desktop Connection		—		×	
	Remote Deskt	on				3
2	Windows Security				>	<
	Enter your credentials					and the second
	These credentials will be used to	connect to	localho	st.		
	ishapiro					100
	Password					
(0)	STAFF\ishapiro					
	Remember me					
	More choices					
	ОК		Cance	2l		
N.						
FRIT	(Hide <u>O</u> ptions	Cor	nnect	Hel	lp	

Once you enter your password, you will see your NBER Desktop PC's screen.

If you use full screen mode, this Remote Desktop Connection could appear very similar to your own home PC's Desktop. So you want to be careful which one you are operating on. For example intending to shut down your own home PC, you might click on "Start" ->Shutdown, but if you happen to be on RDC, you are in fact shutting down your NBER Desktop. In this event, you would need to call/email in NBER IT staff who would have to get into your office to physically power up your PC.

Also, do not try this on your NBER Desktop, otherwise it will be a cyclical even and nothing will work.

Troubleshooting options:

After going through all the steps if your connection still fails among others, there are 2 common problems to look at.

- a) Whether your PuTTy ssh tunnel session is still active. Sometimes it drops, and you would want to reconnect.
- b) If your ssh session is still all right, please contact NBER IT. A very useful item to present to IT is the screen shot that shows the tunnel setup. It is reproduced below.

🕵 PuTTY Configurati	on		×			
Category:						
Session	^	Basic options for your PuTTY session				
Logging		Specify the destination you want to connect to				
Keyboard Bell		host Name (or IP address) Port nber5.nber.org 22				
Features		Connection type:				
Appearance		Load, save or delete a stored session				
- Translation		Saved Sessions				
Colours		Default Settings Load				
Data		age4.nber.org client2b.nber.org Save	1			
Proxy Telnet		nber2.nber.org nber7.nber.org - Rstudio	Í			
⊡- SSH						
		Close window on exit: Always Never Only on clean exit				
	~					
About		Open Cancel				

You can get to this screen, by opening PuTTy, click on the top left corner where the PuTTy icon symbol is displayed, scroll down to saved settings, and highlight your saved session. Then on the left panel expand(+) ssh, and click on "tunnel". This will give you the desired screen. Either send a picture of this screen to IT, or read it out for us.

Setup Using a Mac OS client.

The principle of tunnel is the same for a Mac Client as well. You would need 2 items for a Mac.

Microsoft Remote Desktop Client for a Mac. You can get this by first searching for it in Mac's finder or spotlight as shown in the figure below.
 Finder File Edit View Go Window Help

 [©] 66% [f] Mon 3:02 PM Q :=

Click on the magnifying glass(search) image as shown in the above image. Type "Remote Desktop". You will either see the following screen, or offered to get Microsoft Remote Desktop application and install it from the app store.



If you cannot get it from the app store, you can go to <u>https://go.microsoft.com/fwlink/?</u> <u>linkid=868963</u> to get it. Install the software choosing all the defaults. Set this aside. 2) A "terminal" (A Mac is based on an underlying OS that is a UNIX variant) and it has an in-build ssh client. So you don't need PuTTy. A Mac Terminal is all you need. Again go to Spotlight search and locate "terminal" as shown below:



These are the only 2 times we need. Now we are ready to setup our Remote Desktop session.

Step 1: Make an ssh connection with a tunnel for the appropriate Remote Desktop ports using a Mac terminal. To do this, open terminal by double clicking on terminal when you find that in the spotlight search. From the terminal's command prompt enter the command:

ssh -L 3391:<your NBER PC hostname>.nber.org:3389 <your NBER email username>@nber5.nber.org

In our example,

The NBER PC's hostname is 3rdflnear316.nber.org

The username of your nber email address is mohan (NOT mohan@nber.org)

The ssh server we chose is nber5.nber.org (one can choose any of nber0.nber.org ...

nber9.nber.org)

Collectively the command will look like;

Ssh -L 3391:3rdflnear316.staff.nber.org;3389 mohan@nber5.nber.org



And when you press enter, the first time you will be asked to verify and save the ssh host key for nber server



Answer "yes" and hit enter to proceed. You will then be prompted for your password. This is the password for your NBER server (email) account. A successful login will look like below;

💿 😑 🔹 🏠 admin — ssh -L 3391:3rdflnear316.staff.nber.org:3389 mohan@nber5.nber.org — 113×24						
It is sorted by load average and free memory						
Hostname 	CPU Loa CORES Ave(d Memory W) Total	Memory Used	Memory Free		
nber5	12 0.0	00 66GB	2GB	64GB		
sas1	4 0.0	03 66GB	2GB	63GB		
nber1	12 0.0	03 66GB	7GB	59GB		
nber4	12 0.0	18 264GB	21GB	243GB		- 11
nber8	12 0.2	35 66GB	24GB	42GB		- 11
nber0	16 0.5	35 264GB	35GB	229GB		- 11
nber9	16 0.5	61 132GB	17GB	115GB		
nber7	32 0.5	81 528GB	327GB	201GB		
nber2	16 0.6	36 132GB	27GB	105GB		- 11
nber6	12 0.6	55 396GB	7GB	389GB		
nber3	32 1.5	47 2101GB	518GB	1583GB		
It might benefit you to choose from top of the list.						
RDC now available for GUI access - see http://www.nber.org/help/localhelp/rdc.html						
nber5:/homes/nber/mohan>						

This establishes the ssh tunnel. This is a prerequisite for establishing the Remote Desktop Connection.

Step 2: Make Remote Desktop connection.

Go back to spotlight, and search for Remote Desktop, and double click on "Microsoft Remote Desktop"

You will see the following screen.



Click on Add Desktop. You will see the following screen

0 0 0		Microsoft	t Remote Desktop			-
*	+ •	Deskto	ps Feeds	0	λ Search	
Add	Desktop					
	PC name:	localhost:	3391			
	User account:	Ask me every time				
	General	Display	Devices & Audio	Folders		
F	riendly name:	Optional				
	Group:	Saved Desktops No gateway Image: Second stress				
	Gateway:					
		 Reconnect Connect Swap m 	ect if the connection t to an admin sessio ouse buttons	n is droppe m	d	
			Ca	incel	Add	

Enter localhost: 3391 in the box for PC Name and click Add. This saves this setup and need not be entered again. Double click on this saved desktop.



You will be prompted for username and password.

Saved Desktops Saved Desktops Image: Connection Connection Image: Connection <th></th>	
 Saved Desktops Saved Desktops<th></th>	
Conne Enter your user account This user account will be used to connect to localhost:3391	Save
Conne Enter your user account This user account will be used to connect to localhost:3391	000
(remote PC).	Conne
Username: STAFF\ishapiro	Config
Password:	
Cancel Continue	

User the username STAFF\<your PC's username> and enter the password and click on continue. In our example the username is STAFF\ishapiro. You will be connected to your NBER PC now. Following items are expected to be be rarely needed.

"Finding my NBER PC's IP address"

We need your NBER Desktop PC's hostname or IP address and not your home computer's.

On the bottom right hand corner of your NBER PC, click on the message center.



It will expand to as displayed below. Click on All settings.



From there, click on Network and Internet, and further to Ethernet. On the right double click on "Network Connected" or whatever name you see for "connected" network. Scroll down to the "IP settings section, and that is where you will find your IP address. In case you are not given your hostname by NBER IT staff, replace the "hostname" (in our example 3rdflnear316.staff.nber.org) with the whatever IP you see here.

Below is an example (not your actual IP).

← Settings

setting for you to help you stay under your limit.

Set a data limit to help control data usage on this network

IP settings

IP assignment:	Manual
IPv4 address:	198.71.7.132
IPv4 subnet prefix length:	23
IPv4 gateway:	198.71.7.254
IPv4 DNS servers:	198.71.6.1
	198.71.6.3

Edit

Properties

Link-local IPv6 address:	fe80::9109:3db7:73c6:4f99%2
IPv4 address:	198.71.7.132
IPv4 DNS servers:	198.71.6.1 198.71.6.3
Manufacturor	Positok

NBER PC's Allow RDP and Power Setting

For power settings, go back to "All Settings as above, and select System-> Power settings and make sure the NBER Desktop does not go in sleep mode.

To check if Remote Desktop access is enabled for your NBER Desktop, on the NBER desktop, click on Start, type "control panel." In the control panel, in the search box on the top right corner, type remote desktop.

🖭 remote desktop - Control Panel \times → ✓ ↑ 🔛 → Control Panel remote desktop 5 ~ × ← RemoteApp and Desktop Connections Access RemoteApp and desktops System PAllow remote access to your computer Allow Remote Assistance invitations to be sent from this computer Invite someone to connect to your PC and help you, or offer to help someone else Parch Windows Help and Support for "remote desktop"

Click on Allow remote access to your computer. Make user it is enabled.