



Remote Observing with the GBT



Nichol Cunningham

Things to do before you can remote observe

- Proposals are managed through the DSS.

Dynamic Scheduling System — Science Website - Mozilla Firefox

https://science.nrao.edu/facilities/gbt/schedules/dynamic

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Introduction

The GBT spans a larger range of frequencies than other comparable centimeter/millimeter single-dish telescopes, and is located in a continental, mid-latitude region where weather is dominated by water vapor and small-scale effects. As a result, the observing efficiency of the GBT is enhanced significantly by the GBT's Dynamic Scheduling System (DSS), which allows observers to optimally match their desired weather conditions to their observations, resulting in considerably increased observing efficiency.

Unlike "standard" telescope dynamic scheduling systems, the GBT DSS is not queue based. That is, *the GBT DSS schedules observers, not scripts*. This fact is key to the overall underpinnings of the DSS which creates notifies observers 24-48 hours in advance of their observations.

At the start of a semester, at any any time during the semester, observers are required to indicate when they will not be available to observe on the GBT. Using this information, combined with the availability of the required hardware, the scientific priority of the projects, the predicted weather, and a number of other factors, the DSS will build a schedule every 24 hours for the period 24-48 hours from that time. Once the schedule is built, the relevant observers will be notified that their observations have been placed on the schedule. If the weather deteriorates after the schedule is built, the project observers can choose to give up their time to a backup project, or to observe in spite of the weather.

One of the components of the GBT DSS, which will both improve the ease of use of the GBT and make the DSS plans feasible, is the implementation of an observer's availability calendar for each project. With this calendar each observer can note the times he or she cannot be available for observing, blocking anything from an hour to months. The exciting part of this system is that any observer can update it at any time as that information will be immediately and automatically fed into the scheduling software. As a result, it is extremely easy for observers to make sure that GBT observing does not conflict with any other commitment.



Things to do before you can remote observe

- You need to be assigned remote access in the DSS - only Toney Minter can do this- you must make sure your PI emails him at least two weeks before you plan to observe.

Team Members

Call Order	Name	Email(s)	PI	Contact	Remote	Observer(s)
▲ ▼	Nichol Cunningham	ncunning@nrao.edu			Yes	<input checked="" type="checkbox"/>
▲ ▼	Toney Minter	tminter@nrao.edu	Yes	Yes	Yes	<input checked="" type="checkbox"/>
▲ ▼						<input type="checkbox"/>



Things to do before you can remote observe

- You need to be assigned remote access in the DSS - only Toney Minter can do this- you must make sure you email him at least two weeks before you plan to observe.
- You need to have your project enabled- PI is responsible for this.
- Be careful of setting black out dates in the DSS.

Project Sessions									
Name	Coordinates	Freq	Rcvr	Time billed	Min/Max Dur.	Type	Gr	Enabled	Other Parameters
GBT14B-480-01	RA: 13:50:00.0 Dec: -11:30:00.0	9.0	X	23.75 / 30.0	3.0 - 3.5	spectral line	A	<input type="checkbox"/>	Min Elev 5.0
GBT14B-480-02	RA: 13:50:00.0 Dec: -11:30:00.0	9.0	X	8.75 / 20.0	2.5 - 3.5	spectral line	A	<input checked="" type="checkbox"/>	Min Elev 5.0
GBT14B-480-03	RA: 16:00:00.0 Dec: 10:00:00.0	9.0	X	14.0 / 19.0	3.0 - 12.0	spectral line	A	<input checked="" type="checkbox"/>	Min Elev 5.0



Things to do before you can remote observe

- You want to have your observing scripts ready and catalogs set up. These should be validated in advance.
- You want to access the system remotely from the computer you plan on using for the observations before you get scheduled to make sure you have no problems connecting.
- Have access to a phone when you observe and have the operators number - you will want to ring them about 30 minutes before you are due to start.
- **Operators Number 304-456-2341 and 304-456-2346**
- You should provide the operator with your contact number.
- You should be remotely logged on in advance.



Your project is scheduled

- Now you need to get onto the system remotely.

<https://science.nrao.edu/facilities/gbt/observing/remote-observing-with-the-gbt>

- VNC (Virtual Network Connection).
- You can set this up on any operating system.
- Make sure you test ahead of time and have everything working.



Setting up the VNC Viewer

<https://science.nrao.edu/facilities/gbt/observing/remote-observing-with-the-gbt>

- Firstly you will need to have VNC viewer installed on your machine.
- **Linux** – VNC viewer comes with most Linux distributions

- **Mac** – Chicken of the VNC
(sourceforge.net/projects/cotvnc)



- **Windows** - TightVNC (www.tightvnc.com)
- For Windows you will also need to download an SSH client.
- **Putty** is a freeware SSH client and is available from www.chiark.greenend.org.uk/~sgtatham/putty/download.html



Creating a Password and VNC folder

<https://science.nrao.edu/facilities/gbt/observing/remote-observing-with-the-gbt>

- Open a terminal or the putty for windows
- **SSH into stargate.gb.nrao.edu**
- You will be asked for your GBO username and password
- **>passwd**
- Enter a password this should be different from your GBO password. This is so it can be shared with staff if problems arise during your observing run and they can directly access your session.
- You will also need to make a VNC directory- this is done in the current terminal
- **>mkdir ~/.vnc**

- For windows users once in the command line it is the same setup, you just need the additional step of setting up the *putty*



Setting up the VNC session on titania

<https://science.nrao.edu/facilities/gbt/observing/remote-observing-with-the-gbt>

- SSH into stargate.gb.nrao.edu
- **>ssh stargate.gb.nrao.edu**
- You will be asked for your GBO username and password
- **>ssh titania.gbt.nrao.edu**
- Again you will be asked for your GBO username and password.
- **>vncserver**
- This will output New **'titania:n username desktop is titania:n'**
- The number given by the **n** is your designated session number on titania



Setting up the VNC session on titania

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- SSH into stargate.gb.nrao.edu
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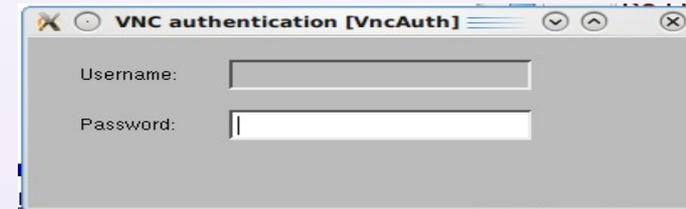


Setting up the tunnel and opening the VNC viewer

- **Linux** - To establish an SSH tunnel and start a VNC viewer, open a terminal on your local computer – and type;

```
>vncviewer -Shared -via YOURLOGIN@stargate.gb.nrao.edu titania.gbt.nrao.edu:n
```

- This should again ask for your GBO password.
- Once entered Launch the chicken of the VNC viewer
- A login window will appear .

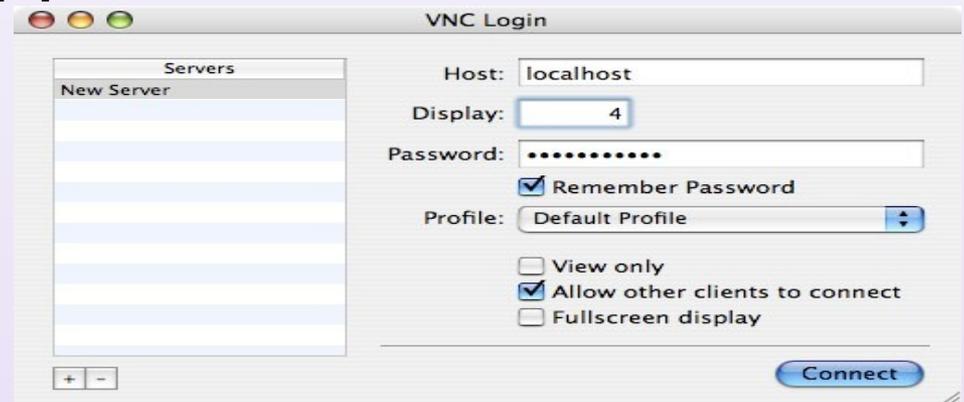


Setting up the tunnel and opening the VNC viewer

Mac - Establish the tunnel

```
>ssh -N -C -L 590n:titania.gbt.nrao.edu:590n YOURLOGIN@stargate.gb.nrao.edu
```

- Launch the chicken of the VNC viewer
- A login window will appear .



You should now have a VNC viewer to titania!!

Setting up the tunnel and opening the VNC viewer

- **Windows** – You need to create the SSH tunnel through another *putty configuration window*
- *The configuration steps with screen shots are given*

<https://science.nrao.edu/facilities/gbt/observing/remote-observing-with-the-gbt>

- Then start the VNC viewer using TightVNC



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OBSERVATORY

You are now connected to titania!!

- You need to open the tools required to complete your observations;
- **Astrid**
- **Cleo**
 - Status
 - Talk and draw
 - Messages
 - Scheduler and skyview
- **GBTIDL**

- **And now you are ready to observe!!**

- **Note- You should only be logged on to titania or ariel for observing only.**



Ending your VNC session

- Make sure you change Astrid back to offline mode when finished
- After closing the VNC Viewer before closing exiting titania through the terminal you should kill the vnc session.

```
[ncunning@titania ~]$ >vncserver -kill :n
```

- Now you can exit out of the terminals, and you are finished until next time.
- Don't forget there is an observer comment form.



Recap

- Make sure you are assigned as a remote observer in the DSS well in advance of your project being enabled.
- Make sure you have the operators number and the operator knows your number and you are confident you can connect remotely. You should be logging on 30 minutes before you are due to observe.
- Make sure your observing scripts validate in advance.
- Make your VNC password something other than your GBO password so we can access your VNC session if there are problems.

<https://science.nrao.edu/facilities/gbt/observing/remote-observing-with-the-gbt>

