Using a Repeater with SvxLink

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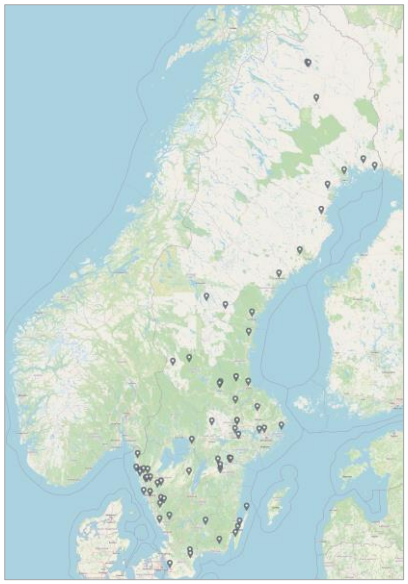
Earlier, we have described how SvxLink works in general, as well as how to set up a repeater with SvxLink. In this article we will deal with how to use a repeater with SvxLink in the easiest way. In its simplest form, it actually happens in exactly the same way as using any repeater. Everything must be backward compatible, otherwise there is a risk that we scare users away from the repeater. Everyone must be able to use the repeater according to their own interest and ability.

National network

SvxLink is not only an advanced repeater logic – but allows us to connect our analogue repeaters in a nationwide network. This network was initially called the "East Coast Link", which we now need to rethink – now that SM6 has also been included!



"Everything is business as usual"

Although a repeater equipped with SvxLink and connected to the national network obviously offers many interesting possibilities – daily traffic on the repeater needs to be able to continue, just as before.

The goal is for everyone to be able to benefit from SvxLink, even with its "very old" 2m or 70cm radio – which may lack both DTMF and subtone. This is the strength of SvxLink, especially in comparison to digital mothers – such as DMR, C4FM and D-Star.

On the Island of Öland we have only added functionality, so it is still possible to open the repeater at 1750 Hz, just as before. In other more traffic-dense areas, this possibility may have already been removed, in favour of opening with DTMF and/or subtone (CTCSS).

The good news is that SvxLink supports all three ways, as needed. What applies to your particular repeater should be possible to find out through the club or other organization that runs the repeater. For SK7RFL, and to some extent also SK7RN, we have chosen to make our own website for the repeater – SK7RFL.se. There you will find all the necessary information, but our users do not really need to know any of what is described there.

The idea is that users can try the system, first without any knowledge at all. After that, you can gradually start to read into and practice the functions you feel interested in.

"Everyone uses the system according to their own interest and ability".

Talk Groups

As with DMR, the SvxLink network is based on talk groups. These follow almost the same numbering as on DMR – but without any interconnection between the networks.

For those who are not fully familiar with the concept, a talk group means a kind of "logical channel" that can be activated and "scanned". And just like at DMR, repeaters have static monitoring on certain talk groups.

When activating a talk group, the call will only reach the repeaters that monitor the talk group (and that are not busy).

The full talk group list is available at the Svx Portal.

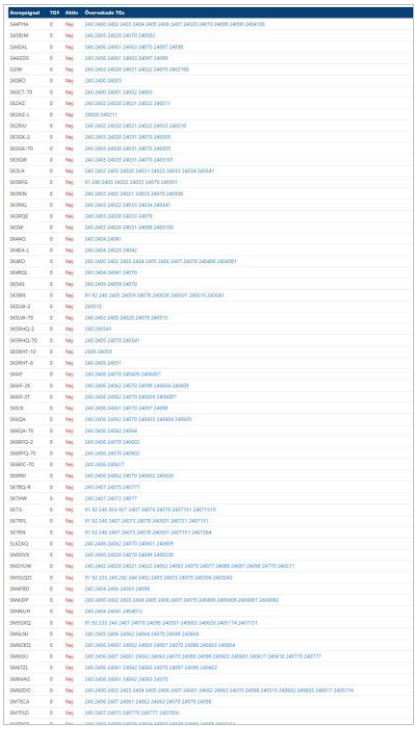
Which talk groups are monitored by each repeater, can be found at the Svx Portal.

Here are some examples of talk groups on the SvxLink network:

240	Sweden
2401	SM1
2402	SM2
24020	SM2 Bulletin
24021	Norrbotten ("Kalix line")
24022	Västerbotten
2403	SM3
24031	Gävleborg
24033	Sundsvall
24034	Örnsköldsvik
240 4	SM4
2405	SM5
240501	Norrköping
240515	Eskilstuna
2406	SM6
24061	Falkenberg
24062	Lysekil
24063	Stor-Göteborg
2407	SM7
24070	SM7 Bulletin
24078	Öland (SK7RFL-SK7RN)

Daily use

By that we mean what happens, when someone starts the repeater, just as usual. Even such use can offer new opportunities!



The repeater can be configured with a default talk group. This is usually activated automatically, without any action from the user, after the first transmission. The talk group can be a district talk group but can also be a more local talk group. A common solution is to use a six-digit talk group, which corresponds to the ID of the club's DMR repeater (if any). Otherwise, of course, you can come up with any unique number (5-7 digits), which otherwise follows the "number standard".

Other nearby repeaters may now have added monitoring on this talk group, and in this way the person who started the repeater in the usual way and called CQ – may get answers from stations located on another repeater. All this can happen, without the user needing to know anything about SvxLink!

Answer calls

Similarly, a user can answer calls, which enter one of the talk groups that the repeater monitors. Usually, talk group 240, own district talk group (e.g. 2407), custom default talk group – and, where applicable, adjacent repeaters or district talk groups are monitored.

A call on a monitored talk group will activate the repeater. However, the call can never interrupt an ongoing QSO on the repeater, whether locally or on any other talk group.

Such a call can be answered, without giving a command – i.e., the user does not need to have either knowledge or an "advanced" radio.

The vast majority of QSOn on SvxLink is made in this way!

Manual talk group selection

Manual activation of talk group can be made, either with DTMF or subtone (CTCSS).

The DTMF command to activate a talk group is **91**, followed by the number of the talk group. All commands end with a "hash mark" (#).

After the command, the repeater will verbally acknowledge the selected talk group – in Swedish or English (configurable).

The command can be given, even if another talk group is currently enabled. Only one talk group can be enabled at the same time.

Talk group activation by CTCSS

In the repeater you can also map one subtone per talk group. This is done according to a "standard", i.e., as a principle, each subtone should always mean the same talk group across the system.

136.5	Local
88.5	Talk group 240
123.5	Talk group 2400
146.2	Talk group 2402
107.2	Talk group 24022
141 ,3	Talk group 2403
151,4	Talk group 2404
91,5	Talk group 2405
118,8	Talk group 2406
156,7	Talk group 2407

Local deviations and additions may occur, e.g. when it comes to activating local talk group.

In order to easily activate different talk groups, you can program one channel location per talk group in your radio – just as you sometimes do on DMR. This applies to the subtone that the radio transmits. The repeater itself always transmits the same yone, regardless of the talk group.

Unlike DTMF activation, subtones can only activate a talk group once, i.e., when the repeater is started. After that, other subtones are ignored, as long as the talk group is active, which normally applies as long as the repeater is open. This means that continued traffic can take place regardless of any subtone being used.

Furthermore, it should be noted that there is a difference between CTCSS-activated talk group and CTCSS squelch. These are thus configured completely independently of each other. For example, a repeater can have subtone activation of talk groups, without requiring subtones when used, or vice versa, or both.

"QSY"

On talk groups covering large areas and many repeats, and in particular on talk group 240 covering the whole country, QSOn should not last too long. In the future, this may also have to be applied to certain district talk groups.

Therefore, there is a kind of "QSY function", which although not changing frequency – but talk group.

The QSY function can be activated manually with the command: **92**#. On talk group 240 there is also an automatic QSY function, which enters after 5 minutes of traffic on the talk group.

When this happens, the repeaters involved in the QSO are transferred to a new talk group, 24099*xx* – while the other repeaters are now released for other traffic. These repeaters are now being verbally notified of this; "*QSY pending*". On such a repeater you now have about 15 seconds if you would like to join QSY. This is now the easiest way to do this, by giving a short PTT print.

Should the 15 seconds have passed, the message "*QSY ignored*" will be given. However, you can still follow the QSY, by giving the command **93**#. This must then be made before any other talk group is activated on the local repeater.

Monitoring an extra talk group

There is a command, **94**, which can be used to temporarily monitor a talk group that is not normally static on the repeater. For example, this can be a bulletin talk group, such as 24020 for SM2 and 24070 for SM7. For example, you enter **9424070**#. Now this talk group will be monitored the repeater for, usually, 60 minutes.

Local QSO

There is also a local talk group "zero", which can be activated manually with the command **910**#. This can be used if you want to move away from the selected talk group. Please note that this only applies for a short time, so the repeater will be restarted if traffic on the talk group continues. However, if immediately after the command you start a local QSO, it will not be interrupted, as long as it is in progress.

Talk group "zero" is also activated from the start on repeaters that do not have a configured default talk group.

EchoLink

A repeater with SvxLink can also have a connection to the *EchoLink* network. Usually, the

EchoLink module is activated by the **2#** command. After that, you can connect to the desired node, by dialling the number followed by the usual "hash mark".

EchoLink should not normally be combined with traffic across talk groups, at least not on talk groups that cover many repeaters – and especially not talk group 240. This is because those who connect via EchoLink usually have no idea what they have ended up in.

To make things easier for users, you can also create so-called *Macros* – which is a kind of short number. With these you can create a short number list for EchoLink, for example. On the repeaters SK7RFL, SK6JX, SK6IF and later alsol on SK5BN the same list is used. Macros are preceded by the letter **D** and, if necessary, end with **#**.

Other Commands

***#**	Says ID, talk group, EchoLink
1#	Parrot
2#	EchoLink
#	EchoLink disconnection
4#	Connect latest EchoLink
5#	METAR info (air weather)
9*#	Says active talk group
#	Module deactivation

These commands can also vary from repeater to repeater.

The parrot sends back everything it hears. It is a good feature to use if you want to listen to yourself. The parrot is terminated with a **#**.

The **5**[*x*] command provides weather information from configured airports. There may also be several such commands – such as **51, 52, 53,** etc.

SSA Bulletin broadcasts

SK2SSA	Tg 24020	Sun 20:00
SK3SSA	Tg 24033	Sun 21:00
SK7SSA	Tg 24070	Sun 09:00

At the time of writing, there are several bulletins on SvxLink, which use common talk groups. If the local repeater does not already monitor the bulletin talk group, monitoring can be temporarily added with the command **94***tg*#.

The bulletins can also be monitored by connecting with *EchoLink* to the node broadcasting the bulletin.

The SM7 bulletin can also be tapped on DMR talk group 240721.

Further developed SvxLink

At Öland's 4 repeaters and in Norrköping there is a further developed version, which is fully backward compatible with other repeaters, but which now supports additional commands and functions.

The repeaters on Öland are automatically connected via SvxLink talk group 24078, which takes place without any action from the user. This also applies to incoming EchoLink and DMR calls. This may include to some extent Norrköping's 70 cm repeater SK5BN/R.

In the further developed variant:

Commands do not have to end with a "hash mark" (**#**).

Special commands:

*	Provides ID only
0*	Provides full ID
9*	Provides active talk group
2*	Provides list of connected stations via EchoLink.

91 in front of regular talk group numbers also does not need to be dialled, i.e., it is enough to simply dial the talk group number. There are also additional abbreviated talk group numbers, the full command list is available at SK7RFL.se.

Active talk group can be disabled by using the **9** command.

Command **91** enables the default talk group (rather than the last talk group).

Outgoing EchoLink can be activated, by only dialling the node number directly, without first activating the module with **2#**. There is also a common macro list, to call Swedish repeaters with the **D***xx* command.

Incoming EchoLink is handled separately and cannot interrupt a QSO on a talk group (except on the local talk group). On the Island of Öland, EchoLink to SK7RFL-R also reach SK7RN's three repeaters.

Digital bridge at SK7RFL that bridges DMR talk group 240721 together with SvxLink talk group 24078. Just send on DMR and you can reach SK7RFL plus SK7RN's three repeaters. The bridge also lets you activate any talk group or reflector on DMR, YSF and D-star. The same type of bridge is also available on SK5BN.

"Bulletin mode", which locks the repeaters to the bulletin talk group for a certain time interval.

It is of course important to know that these "improvements" only work on the repeaters SK7RFL, SK7RN and SK5BN. On the other nodes in the network, you need to stick to the standard commands.

Svx Portal

The Svx Portal is a standalone website, which in real time displays the status of the system. This is an excellent tool to use if you want to increase your understanding of SvxLink.

Reflector clients; Displays a list of now connected nodes and which talk groups they monitor. The list also shows active nodes, and which talk group they are currently using.

Monitor; Here you can listen live to certain talk groups. Talk group 240 is also recorded, so that traffic can be intercepted afterwards.

Station Information; Displays for each selected repeater: Information, Hardware, DTMF Commands, and Status. This information is updated by the repeater owner.

System description; An overview user guide. It describes much the same thing that is in this article.

Talk groups; A manually generated list of talk groups on the national reflector.

List receivers; A list of repeaters, showing its status. Each repeater also shows which receiver is active and, if so, what signal quality the current received has. For multiple receivers (Voting), you can click on the header and you will see a list of all the repeater's receivers.

Statistics; Displays daily use of talk groups and nodes. There are

also monthly and annual summaries.

Log; Displays events in the system, such as nodes' up/down connection, talk group selection, and receiver signal quality.

Last heard; Displays recent speakers over the entire network. Further, there are more functions available. On this page, as well as the Portal's start page, you may click on a talk group number, to display a similar list – but now filtered on the talk group you selected. There is also a function, that allows you to show the traffic on a specific repeater in real time.

Receivers; A list of receivers that, unlike the previous list, is fully expanded.

CTCSS Map Table; Shows which tones are used to activate a talk group on each repeater. Here you can also download a file that can be imported into a radio's CPS program.

My stations; Only appears if you are logged in to the Portal. This tab opens a new page with additional selections:

- *My stations*, which is used to update the respective repeater's information.
- Create *node_info.json*, which is used to display the repeater correctly on the portal.
- Create parameters for *svxlink.conf*.

Map; An interactive map that shows the QTH and status of the repeaters. The symbols change colour, indicating active talk group. You can click on the repeaters and get a status pane. Finally, you can view the coverage area of the repeaters.

Summary

The network is growing, and more and more amateurs are becoming aware of the connected nodes. Traffic will increase, but since we use talk groups in the same way as we do on DMR, for example, this does not in itself have to lead to the repeaters and simplex nodes of the network being occupied by seemingly "irrelevant traffic".

My firm view is that our repeaters are for use, obviously taking into account good traffic discipline – but that should not be any news for us practitioners of this radio hobby.

My experience is that the vast majority of users benefit from SvxLink's features, without necessarily being familiar with how it works. On Oland, it is also not often that someone gives a DTMF command since most of the time you simply do not need it.

This is precisely what makes SvxLink a competitive alternative to DMR, for example. And the sound quality is just as good as it always is on analogue radio.

For those who wish to study more about SvxLink, these websites can be recommended:

- SK7RFL.se
- Repeater School
- SvxLink.org
- Svx Portal
- User forums

SK7RFL has some slide shows explaining the functionality of SvxLink.

The Repeater school can be recommended! It describes function at roughly the same level as in this article, but "packaged" in well-defined lessons.

The repeater school also has several supplements, where more advanced features are described.