# Communications Resilience

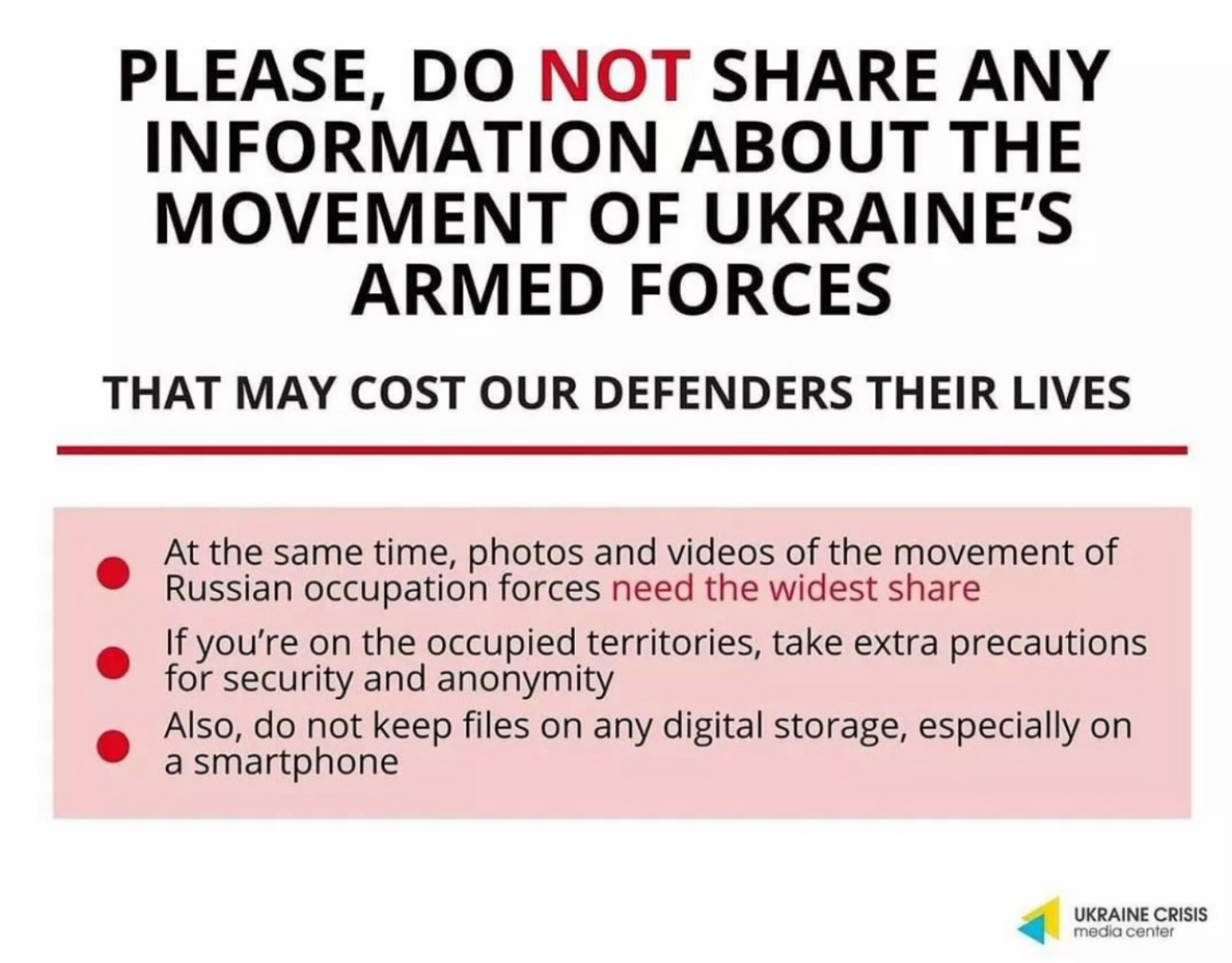
Ukranian version: https://hackmd.io/@caffeinum/commresilience_ukr (https://hackmd.io/@caffeinum/commresilience_ukr)

## General Opsec

Encrypt everything. Don't carry anything with you that isn't necessary from point to point. Not having something on you is better than having it on you encrypted if you are caught. **Delete your messages / history routinely, turn off fingerprint unlock on phone/devices.**

Any transmitted signal is trackable/triangulatable instantly with the right monitoring setup, so transmit only when absolutely necessary if trying to avoid detection. Directional transmission (with directional antenna) is less risky than omnidirectionally blasting a signal.

If possible, set up repeaters, for wider range and for better chances of being able to obfuscate origin of signal.




## Useful physical tools

- Portable batteries - as many as possible, keep them charged, charge them when opportunity arises
- UPS / Backup power systems, solar chargers, large portable high-capacity lithium-ion or lead-acid batteries (can likely be found at camping stores)
- Soldering iron, solder, wires, cables of all kinds, adapters
- Cable crimping and stripping tools, to make quick connectors
- Particularly useful - something like: https://eleshop.eu/ts100.html (https://eleshop.eu/ts100.html) - portable soldering iron that can be operated via a 24v high-current drone battery, very useful for field repairs, emergency patching of downed lines, etc
- Laptops, burner phones, USB drives, keep things as portable as possible
- Pocketable/small routers and wifi access-points/repeaters with low power requirements (to power from portable batteries)

- Raspberry pi or similar SBC boards with GPIO pins, for field debugging and to use as reprogramming/reflashing aid to repurpose existing hardware, or augment it (and any JTAG programmers you can find)
- Ham/Shortwave radio systems
- Satellite phones / satellite messengers (often sold at camping stores as well
- Baofeng-style handheld emergy radio (https://baofengtech.com/product/dmr-6x2/ (https://baofengtech.com/product/dmr-6x2/)) - very little setup, good for emergency comms, just be aware that the communication will be unencrypted - they can also be hacked somewhat for other protocols
- Binoculars, rangefinder, laser pointer (useful for reconnaissance + aligning satellite dishes and antennas)

# P2P Messenger

## Offline / Local (Bluetooth)

- https://briarproject.org/ (https://briarproject.org/) (F-Droid (https://briarproject.org/fdroid)) (Google Play (https://play.google.com/store/apps/details?id=org.briarproject.briar.android))
  - Also works online, over wifi LAN, internet or Tor
- bridgefy (https://bridgefy.me/) (Apple iOS (https://apps.apple.com/us/app/bridgefy/id975776347/?utm_source=bridgefy-website&utm_medium=website-ios&utm_campaign=home-ios&utm_content=app-store)) (Google Play (https://play.google.com/store/apps/details?id=me.bridgefy.main&referrer=utm_source=bridgefy&utm_medium=website&utm_term=demo-app&utm_content=google-play))
  - "Bridgefy is the app that lets you send offline text messages when you don't have access to the Internet, by simply turning on Bluetooth. "

## Online

Remember to change disappearing messages on, and routinely delete chat history daily or after you've confirmed that sensitive information has been received.

- Whatsapp - account is linked to phone number
- Signal (https://signal.org/) - account is linked to phone number
- Telegram… **DO NOT USE unless absolutely necessary**, group chat isn't encrypted! unless selecting the secure chat option with another person in private message / DM - account is linked to phone number

End to end encrypted pastebin (share information securely): https://0bin.net/ (https://0bin.net/)

### Anonimity

- Tor - Anonymize your IP/origin when accessing normal websites, and ability to access .onion darknet sites (https://www.torproject.org/download/ (https://www.torproject.org/download/))
  - Setting up a hidden service (.onion) that can be securely accessed with end to end encryption, completely anonymous both ways, without needing to forward ports:
  - https://hackernoon.com/setting-up-a-tor-hidden-service-a-how-to-guide-zs1s3yoy (https://hackernoon.com/setting-up-a-tor-hidden-service-a-how-to-guide-zs1s3yoy)
- I2P - Internal darknet-only anonymizing network via .i2p sites (https://geti2p.net/en/ (https://geti2p.net/en/))
  - Setting up hidden service (eepsite) on I2P:
  - https://mhatta.medium.com/how-to-set-up-untraceable-websites-eepsites-on-i2p-1fe26069271d (https://mhatta.medium.com/how-to-set-up-untraceable-websites-eepsites-on-i2p-1fe26069271d)

Darknet pastebins (share information anonymously + securely): https://deepweblinks.net/pastebin/ (https://deepweblinks.net/pastebin/)

## Online: WAN or LAN

- Tox - No registration / phone number required, requires internet
  - Toxic (https://github.com/Jfreegman/toxic)
  - qTOX (https://qtox.github.io/) (Desktop + Audio calls)
  - uTox (https://github.com/uTox/uTox) (Desktop + Audio calls)
  - TRIfA (Android): (F-Droid (https://f-droid.org/en/packages/com.zoffcc.applications.trifa/)) (Source Code (https://github.com/zoff99/ToxAndroidRefImpl))
- IRC
  - **Clients** (use `/list` on LAN)
    - HexChat (https://hexchat.github.io/)
      - Windows Store (https://www.microsoft.com/store/apps/9NRRBGTTM4J2)
      - 4b47930951ebc46e9cb8e8201856b8bddcd7499f5510fe1059f67d65cc80bf07 HexChat 2.16.1 x64.exe (https://dl.hexchat.net/hexchat/HexChat%202.16.1%20x64.exe)
      - ab6db5c0cdd0a1ddd80dd7124430a6b56d75905859e4bab68c973837171c6161 HexChat 2.16.1 x86.exe (https://dl.hexchat.net/hexchat/HexChat%202.16.1%20x86.exe)
      - a7e497da71df419daf9855582d51c723a2611de25d5e97b5efc33fe78da5c4c7 hexchat-2.16.1.tar.xz (https://dl.hexchat.net/hexchat/hexchat-2.16.1.tar.xz)

        - mIRC (https://www.mirc.com/) - Windows only
        - irssi (https://irssi.org/) (Github (https://github.com/irssi/irssi/releases))
    - **Servers**
        - UnrealIRCd (https://www.unrealircd.org/)
    - **Networks**
        - SwiftIRC (ports 6697 for SSL)
            - fiery.swiftirc.net (http://fiery.swiftirc.net) (California USA) - `143.198.146.114` / `2604:a880:4:1d0::75:0`
            - tardis.swiftirc.net (http://tardis.swiftirc.net) (London UK) - `159.65.55.232` / `2a03:b0c0:1:d0::ec0:8001`
        - Liberia
        - Snoonet - `irc.snoonet.org` (6697 for SSL)
            - `178.62.125.123` / `2a03:b0c0:1:d0::bd4:a001` (DigitalOcean, UK)
            - SSL fingerprint: `AB:71:85:E8:60:44:82:FA:B8:77:74:DF:16:D3:B0:95:7A:F3:46:8E`
        - rizon - `irc.rizon.net` (6697 or 9999 for SSL)
            - IPv4: `178.239.166.249` / `188.240.145.30`
            - IPv6: `2001:6b0:78::30` / `2001:19f0:5c01:1abe:5400:2ff:fef7:5abf`
- XMPP / Jabber
    - **Clients**
        - Gajim (https://gajim.org/ (https://gajim.org/)) + TURN ON OMEMO PLUGIN FOR END-TO-END ENCRYPTION
    - **Servers**
        - Prosody IM (https://prosody.im/) - Very easy to setup, works over internet, over lan, very configurable.

# Physical lines

## Landline

Landlines are also valuable in these situations. The signal through them is passive and doesn't require power, meaning that they can work even if electricity goes out. As long as the physical connections aren't severed, it will be an invaluable way to maintain comms.

Dial-up will also still work if power to your house is cut off, as long as the

termination/switching station (the router for the landline network) itself still has power. Damage to landlines is much easier repaired than damage to broadband/fiber lines, so even if connections are severed they could be easily repaired.

### Ethernet

The maximum range of cat5e cable is 100 meters, and Power Over Ethernet is supported at that range too. Running ethernet lines is a good way to maintain lower profile (no wireless signal activity) local networks if the physical lines can be hidden.

Also better to have your wireless repeater 100m away from where you are operating, in case it gets attacked.

## Maps / cellular

Basic cell connectivity is more hardy than internet connectivity. Jot down numbers of friends or anyone who can help. Download “OsmAnd” via F-Droid and save map data locally onto your phone. GPS works without internet, you just need to be outside with a clear view of the sky (unless they jam GPS).

Without google maps and its routefinding, it will be much easier to use GPS markers + map positioning to orient yourselves and plan operations, meets, etc.

OsmAnd android app: https://f-droid.org/en/packages/net.osmand.plus/ (https://f-droid.org/en/packages/net.osmand.plus/)

Even though GPS is entirely passive and requires no outgoing signal, your phone will likely continually blast signal to find cell towers when it’s not in airplane mode. Even if you disable the 4G antenna, the GPS functionality is part of the 4G modem in the phone these days and there may still be signal leak.

If you want to be entirely sure you are not leaking signal, you can purchase/procure a “handheld GPS”, like the ones for hiking or camping, which will have built in maps.

## SDR

Many TV tuner sticks can be converted into Software Defined Radios that allow for receiving a signal across a wide spectrum.

If you’re lucky and live next to an electronics hobby shop, you might be able to pick up something like a HackRF, CubicSDR, LimeSDR, BladeRF, etc.

Some of these can even be repurposed into base stations to restore cell phone functionality to some extent.

See more info here:

https://rtl-sdr.com/about-rtl-sdr/ (https://rtl-sdr.com/about-rtl-sdr/)

https://greatscottgadgets.com/hackrf/ (https://greatscottgadgets.com/hackrf/)

https://limemicro.com/products/boards/limesdr/ (https://limemicro.com/products/boards/limesdr/)

https://cubicsdr.com/ (https://cubicsdr.com/)

https://www.nuand.com/bladerf-2-0-micro/ (https://www.nuand.com/bladerf-2-0-micro/)

https://danielpocock.com/quickstart-sdr-ham-radio-gqrx-gnu-radio/ (https://danielpocock.com/quickstart-sdr-ham-radio-gqrx-gnu-radio/)

These can be used to set up ad-hoc low bandwidth meshnets.

Download all the drivers, packages and software for every possible bit of hardware around. If you find the hardware but lack the software you'll be just as fucked.

Many more devices today can be repurposed for emergency comms. Anything with an antenna can be valuable.

## Apps

Mobile apps can help in many situations and provide

- Translation (https://play.google.com/store/apps/details?id=com.anhlt.multitranslator&hl=en_US&gl=US)
- First Aid (https://play.google.com/store/apps/details?id=com.cube.arc.fa&hl=en_US&gl=US)
- Practical calculation tool for antennas (https://play.google.com/store/apps/details?id=com.daveyhollenberg.amateurradiotoolkit&hl=en_US&gl=US)

## Valuable Information

All of the text-only version of the English-Language wikipedia can be downloaded here: https://en.wikipedia.org/wiki/Wikipedia:Database_download#Where_do_I_get_it.3F (https://en.wikipedia.org/wiki/Wikipedia:Database_download#Where_do_I_get_it.3F)

You can even put the entire copy on your phone in browsable fashion: https://www.kiwix.org

/en/download/ (https://www.kiwix.org/en/download/)

Extremely valuable resource to look things up in the field, whether survival, medical, technical, or location relevant.

# Meshnets

A mesh network allows for reliable and robust p2p communication across devices when faced with intermittent device failure (e.g. your internet exchange gets bombed), optionally with multiple upstream internet access routes.

libremesh, CJDNS, Babel, list of routers that can be flashed with OpenWRT/MeshNet enabled firmware:

## libremesh (https://libremesh.org/)

LibreMesh is a modular framework for creating OpenWrt-based firmwares for wireless mesh nodes. Several communities around the world use LibreMesh as the foundation of their local mesh firmwares.

## cjdns (https://github.com/cjdelisle/cjdns)

Cjdns implements an encrypted IPv6 network using public-key cryptography for address allocation and a distributed hash table for routing. This provides near-zero-configuration networking, and prevents many of the security and scalability issues that plague existing networks.

## Babeld (https://github.com/jech/babeld)

A layer-2 distance-vector loop-avoidant routing protocol, used to distribute information about the accessibility of routes to individual hosts which can work across multiple interfaces (e.g. multiple wifi and physical links, it will auto-failover and move traffic onto the most performing lowest latency route).

The simplest setup is to assign yourself a random 10.0/8 address, enable `babeld` on all interfaces, and connect point-to-point with other nodes also running it. This creates a flat lan-like auto-updating route table (similar to ARP, but for IPs) where packets may be routed across multiple intermediary hosts to reach the destination.

- It can also be run over wireguard and other VPNs (https://blog.fugoes.xyz/2018/02/03/Run-Babeld-over-Wireguard.html).

- It's supported by the FRRouting Project (a fork of Quagga) (https://frrouting.org/)

### OpenWRT

https://openwrt.org/docs/guide-user/network/wifi/mesh/start (https://openwrt.org/docs/guide-user/network/wifi/mesh/start)

## Proxy Load Balancing

You may have many socks5 proxies in various countries, but your internet connection's upstream trunks may also be intermittent or actively blocked to certain countries.

For reliable proxy access, use a load balancer to access your proxies, preferably with routine connectivity checking to only use 'live' ones.

- haproxy (https://www.haproxy.org/)
- proxychains-ng (https://github.com/rofl0r/proxychains-ng)
- proxychains (https://github.com/haad/proxychains)

## Antennas

> Don't forget the OPSEC rules!

Many satellite dishes can be repurposed into antennas with very long range, if you live close to the border you might be able to reach cell towers or wifi points in other countries!

Even without any adapters or direct connections, a satellite dish always functions as a "signal lens", so placing your router or phone at the point where the reflections from the dish "converge" will boost your signal.

More info below:

https://www.purevpn.com/blog/how-to-make-a-satellite-dish-wifi-antenna/ (https://www.purevpn.com/blog/how-to-make-a-satellite-dish-wifi-antenna/)
https://www.instructables.com/Cell-Phone-WiFi-Signal-Booster-Antenna/ (https://www.instructables.com/Cell-Phone-WiFi-Signal-Booster-Antenna/)

### Resources

- General book: http://wndw.net/book.html (http://wndw.net/book.html)

- Good presentation: http://wireless.ictp.it/school_2007/lectures/rob/diy-antennas/index.html (http://wireless.ictp.it/school_2007/lectures/rob/diy-antennas/index.html)
    - Basically you can always do the same as in the other DIY guides. I think it is a logical conclusion what constructions can deliver a good signal.

### DIY Guides

- Tin-Can: https://www.wikihow.com/Make-a-Wifi-Antenna (https://www.wikihow.com/Make-a-Wifi-Antenna)
- Simple omni-directonal antenna: https://www.instructables.com/WIFI-Antenna-Hack!/ (https://www.instructables.com/WIFI-Antenna-Hack!/)

Even such stuff as below works. Get creative!

## Personal Health + Safety

See:

- https://www.ready.gov/kit (https://www.ready.gov/kit)
- https://www.redcross.org/get-help/how-to-prepare-for-emergencies/survival-kit-supplies.html (https://www.redcross.org/get-help/how-to-prepare-for-emergencies/survival-kit-supplies.html)

Common items:

- Water (one gallon per person per day for several days)
- Food (at least a several-day supply of non-perishable food)
- Spare clothes, in plastic bag to keep dry
- Plastic bags
- Flashlight + Extra batteries / charger packs + charger cables
- Tampons / pads / toilet paper etc.
- Swissarmy knife / Multi-purpose tool / knife
- Passport + ID cards / driving license + vaccine status (make photocopies or scan/picture on *everybodies* phones)
- Cash, coins + notes, BTC?, Gold, jewellery etc
- 'Space blanket' / 'emergency blanket'
- Sleeping bag or blanket + ground mat or extra cardboard
- Waterproof clothes + warm gloves + hat + scarf + thermals
- First-aid kit, gauze, tourniquet (women's tights work if you nothing else)
- Manual can opener, or serated knife (works as can opener)
- Variety of USB, USB-C, mini-usb + other power cables
- Isopropol alcohol (not for drinking)
- Vodka (for drinking + disinfecting)
- Dust mask / surgical masks etc.
- Wrench, pliers, screwdrivers, scissors, crowbar etc.
- Plastic sheeting & duct tape, chain + lock
- Lighter / matches, candles
- Paracetamol / Acetaminophen, Ibuprofen, Bleach / Peroxide
- A pan or similar object (a hot tea helps soul and body)
- Thermos flask, to keep stuff warm
- Coffee, tea, powdered soup
- Small fishing equipment
- Compass