

Automated Telephone Adapter (ATA) Setup

and other ways to Reduce Personal Telecommunications Costs:

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Canadians have amongst the highest telecommunications bills of users of any country. Years ago many of us went from renting, to buying our landline telephone sets to save on monthly fees. Now that our telephone and cable companies also sell us stable internet services, the time has come for most Canadians with home internet (other than dial up) and our legacy landline phones to take the next step and buy, the minor additional equipment and services to:

- eliminate all ongoing monthly landline legacy telephone fees, (except for fees associated with calling long distance beyond the 10 Canadian provinces and the 48 continental US states),
- eliminate monthly cable TV fees, except when one is a dedicated North American team or league specific fan,
- reduce our need for high cost monthly cell phone plan fees.

This written article principally details the setup of home equipment and services to provide “voice over internet protocol (VoIP)” telephone services. Of similar note, while not explored in further detail here-in, additional home telecommunications services savings are available:

- <https://www.howtogeek.com/170940/8-reasons-you-should-be-using-google-voice-if-youre-a-american/> documents that for those on cell phones and/or tablets, there are apps like:
 - Groove IP at <https://play.google.com/store/apps/details?id=com.snrblabs.grooveip> and
 - Talkatone at <http://www.talkatone.com/> (•In addition there are Nimbuzz, Fring & Tasker (used with a 3rd party plug in called Locale GV Settings))

that allow one to receive and place calls over internet enabled WiFi or cellular data connection — without need for cell phone minutes. These apps can be used by anyone to place free calls to the US or Canada, but they become a full sending-and-receiving solution when paired with a Google Voice account, an appropriate ATA as selected below, and an optional \$25 adapter. There is also CSipSimple that can link your Android phone to your SIP provider via WIFI.

- For TV, off air antennas give excellent quality signals for local stations, and internet TV streaming boxes, as cheap as \$50, give the equivalent of nonlocal cable TV services free, though do not generally provide free viewing of major North American sports events. 2 reviews of some available options are at:
<http://cutmybills.ca/cut-cable-tv-bill/online-streaming-options-to-replace-my-cable-tv/which-roku-should-i-buy-roku-p-layer-comparison-buying-guide-2017>
<http://cutmybills.ca/cut-cable-tv-bill/online-streaming-options-to-replace-my-cable-tv/android-tv-box-review-skystream-one> In addition, one may use a Raspberry Pi (<\$50) or MS-Windows 10.
- While we all need an internet connection, most of us could greatly reduce our bill if we shared our internet with our neighbour(s). Neighbours need to elect a trustworthy neighbour in a suitable location to power a central hub modem from which the local area network (LAN) ethernet cabling extends. This location might be in a box mounted on the fence at a shared corner of four lots, with additional cable lengths so the box can be relocated to any of 4 neighbours, so as to provide for easy re-location should the trustworthy neighbour move. When a length in excess of the maximum (300' copper cable lengths or in the case of plastic

fiber ~ 1000 feet), is needed to get to a neighbour's home, a router/ repeater/splitter can be placed in between each length of cable to regenerate the signal. To support distribution of the LAN to multiple devices within any home, another router/ splitter is required. To maximize resilience (from events such as the neighbour moving away, or being out of town when a hardware failure occurs), and minimize cabling costs, it might be appropriate to locate equipment in a locked weatherproof box(es) at a shared back lot corner(s).

For home landline phones, **one time** payments totalling less than Cdn \$200 can end monthly fees of 1 or 2 phone lines. The payments purchase 1) an ATA that routes your phone calls on and off your home internet; and 2) services of an internet telephone service company (ITSC) to do the same elsewhere. Specifically for Canadians, I recommend the payments purchase:

- 1) a US\$70 Obihai model OBi202 automated telephone adapter (ATA), a box 4.1 x 4.5 x 1.2", that you can relocate to any reliable internet connection world wide when you move or travel.

(Visit <http://www.obihai.com/how-to-get> for where or how to purchase an Obihai model OBi202. The OBi202 supports [optional Obihai adapters(US\$): \$27 wireless LAN, \$23 wireless bluetooth, and but get a now desupported \$67 OBi110 if needing to reliably directly interface to an old telephone (POTS) line], the OBiON softphone app for Android and iPhone, and Google Voice support, that via ObiTalk setup makes phones connected to the ATA be recognized by Google Voice as US based, personal computer software telephones. Google Voice support was temporarily broken 2014/05 through official restoration 2014/09, by Obihai software updates. Google Voice and related offerings are explained at <https://support.google.com/voice/answer/115061?hl=en> and its links.)

- 2) a local telephone number provisioned by an internet telephone service company, (ITSC) such as freephoneline.ca, for ~Cdn\$80+HST, so others in our region who have yet to upgrade, can continue to connect to us without paying long distance charges. (Most of us would be able to do this for free with Google Voice if we lived in the US, but with some loss of privacy. NB: Google provides only US telephone numbers, that do not support the T.38.) freephoneline.ca supports the T38 fax protocol. While generally line quality is better than provided by landline telephone companies, one may need to pay extra to get line quality high enough to support faxing to, but not from, some rural long distance locations. (NB: With faxing one: needs disable call waiting, may need to reduce the distance between the OBi202 and the fax to less than 6', and may also need the solution <https://www.obitalk.com/forum/index.php?topic=6169.0> reply 8.)

(Alternatively most other ITSCs offer only pay as you go VoIP services. Many alternative ATAs and ITSCs are at: <https://www.voip-info.org/wiki/view/Cheapest+ATAs+and+Service#Canada>. As at 2017/7 voip.ms offers pay as you go ~¢ Cdn + HST: outgoing calls to [Canadian provinces: ½¢/minute, and 48 US states: 1¢/minute] + incoming calls at {0.9¢/minute or \$4.25/mo} + 85¢/mo/telephone number . You might choose to use voip.ms for a few months to verify your ATA, modem and internet setup are adequately reliable enough, or to provide a temporary telephone number for a special event.)

Unlike with landline telephone companies, together the OBi202 ATA and the above ITSCs provide, **at no extra charge**, an extensive list of features (with options not here detailed), such as for call display, waiting, notification, screening, voice mail, periodic redial until ring or answer, block, forward, history, and free long distance to most Canada urban areas, and more. Such

includes support of concurrent use of 2 separate telephone sets by 2 different people each on separate calls provisioned with just one telephone number from a single ISTC, as per <http://www.obitalk.com/forum/index.php?topic=6046.0>, (though I'd wire any separate phones to avoid the high EMF of Vtech telephones in my home). Conferencing is free with freephoneline.ca via the "Bellcore" method, <http://forum.fongo.com/viewtopic.php?f=14&t=3320&p=19524&hilit=conferencing#p19524>. Google Voice charges 1¢/minute for conferencing, but there is a free 3rd party workaround at <https://www.obitalk.com/forum/index.php?topic=12413.msg79023#msg79023>. As at 2013/02 Google Voice would not accept ATA requests to call forward when the assigned ATA port is busy. Answers to other issues may be found by use of the search box in the top right of these 2 pages. Only specific models of Obihai ATAs support Google Voice. OBi200 and OBi202 each support up to 4 Google Voice accounts each created under separate Google Gmail accounts. Google Voice:

- extends the free long distance calling to all (or possibly nearly all) of Canada and the continental US,
- provides free telephone number(s) in your choice of US urban areas, where US residents may telephone to reach you at lower long distance fees. (I chose New York City.)
- gives SMS messaging but not from banks or web site subscription services.

(Access via <https://www.google.com/voice>, Note the 2 multi line flag icons near top left of the tab window. A click of the left most will display all messages, unread ones bolded, including SMS messages sent and received, while thereafter a mouse click the multi line blue flag icon with text "Send a message" just to the right of the 1st blue flag icon, will set one up to compose an SMS message. The selecting the icons under the first, provide a call log, access to voice messages, and additional features including settings (the gear wheel) and help respectively).

Like a cell phone, but without roaming charges, you can also take your ATA and a small telephone on your travels, and get the same advanced services when connected elsewhere to internet services pretty much worldwide, whether next door or in New Zealand, so as not miss important calls, or change the way others connect with you by telephone, despite the change of your physical location. The **down sides** are:

- one may lose landlines' direct and cheap 911 service, (and monthly charges), and so for prudence:

Label each of one's phones connected to the ATA with one's current local emergency Police, Fire, and possibly Ambulance telephone numbers, and one's address,

or upon calling (E)911 via the ATA, endure for example with freephoneline.ca : a \$35 fee, where based upon the last address you pre-registered, someone else connects your call to your local emergency services and gives them that address, which could be problematic if you are on the move with the ATA. Other ITSPs provide (E)911 as part of a monthly fee. (Bell may leave 911 service enabled on the line as it changes an existing telephone line to "dry DSL". Note that if 911 remains, it cannot be accessed by telephones connected to the ATA, but only by telephones connected to the phone line port out of the demarcation point filter splitter.)

- to transfer over one's existing number one may need to pay a one time ~\$25 fee.
- the ATA supports telephones whose ringer numbers total 5 or less. Bell may support up to 10.

- if remaining with the telephone company to provide internet, they may add a dry line fee of \$8-\$10 a month. Likely, this fee can be partially, fully or even more than fully offset by changing to an internet reseller, and/or sharing internet with one's neighbour(s), something that all internet providers do, but is hidden from their customers.
- if roaming with your Obihai ATA, and wanting to use WIFI, rather than a wired ethernet LAN connection, one needs access to a computer or tablet with a browser and a USB port to update an Obihai ATA WIFI USB stick with the appropriate WIFI credentials.
- one may wish to buy an uninterruptable power supply, alias UPS, (~Cdn\$80 and up) to power the modem and ATA during a power failure, so that you can continue to communicate by telephone, until the battery powering the local neighbourhood internet concentrator node or your UPS battery is drained. (A cheap alternative is to provide a car or wheel chair battery, with a series of diodes to drop the voltage to 12 volts needed by the modem or ATA, with default recharging based upon a weekly timer. Never at the same time have both the charger and [the modem and/or ATA] connected directly to the battery. After some years the battery may need replacing as it ages and fails to maintain adequate output above 12.0 volts.)

At: <http://forums.redflagdeals.com/newegg-obi202-ata-69-99-1-50-ehf-free-shipping-tax-2057179/>, the power user blog thread beginning Nov 21st, 2016 2:49 pm by *Webslinger*, lists the additional benefits of the OBi202, including those versus other ATAs, like reliability, ongoing enhancements, up to 12 active calls via 2 ports with fax support, Google Voice support, and setup nuance details in greater depth than herein described. (12 calls ... 2 with each of up to 4 active phone numbers, + 4 additional gateway calls. The entry dated Feb 27th, 2017 9:04 am #11 by *Webslinger*, at: <http://forums.redflagdeals.com/newegg-obi200-ata-49-99-1-50-ehf-4-99-shipping-tax-2083622/#p27515997> describes gateway setups. Separate services may be assigned unique ring tones.) A 2nd OBi202 ATA can be used to link a village or extended family of multiple homes split in 2 across any distance, including multiple continents, without any long distance fees so long as there is adequate internet at both ends. Through the user support forum, circles of trust have also formed allowing users in different countries to patch calls through each others devices toll free. Ref: <http://blog.tmcnet.com/blog/tom-keating/voip/obi202-review.asp>

In Ottawa, I have a reliable internet connection, rated at 10 Mb/sec down, 7 Mb/sec up, unlimited Gbytes/mo at \$42.88 tax included, including ~\$10 monthly fee surcharge for a dry DSL line without POTS analogue telephone service, from the internet service provider (ISP) National Capital Freenet www.ncf.ca, (an Ottawa coop and reseller of Bell DSL up to 100 Mb/sec but not yet fiber to the home. Fiber to the home supports speeds greater than 100 Mb/sec). My DSL service can support 3 streaming videos concurrently, but required me to provide or buy a copper wire modem (available typically ~\$20 used or \$100 new).

VOIP problems occur when the internet bandwidth:

- is not sufficient (ie: not consistently greater than > 0.250 Mb/second up and down), or
- is provided with fluctuating ping response times, (> 20% of average) alias jitter, or
- is provided with ping response times > 200ms.

Before replacing a landline telephone with an ATA, it is prudent to ping test ones potential Internet Telephone Service Provider servers, to ensure the internet service wholesaler is not

oversubscribed in the neighbourhood. One can do so with <http://speedtest.net/> . If the local neighbourhood internet service is oversubscribed, momentary loss of bandwidth will occur. Such is most likely to occur evenings, especially Sunday evenings, 7-10 pm. The 0.250Gb/sec allows for errors. One can ratchet down the ATA voice quality to accommodate lower bandwidth. The default VoIP protocol G711u uses approximately 128kb/s of bandwidth, whereas G729a uses only 16kb/s. One can also test VoIP via using a softphone service free from freephoneline.ca, or US\$5 from www.comfi.com/pc2phone/ on your personal computer or tablet. When problems occur at or after the ITSP one may receive a verbal progress or error code, defined at: https://en.wikipedia.org/wiki/List_of_SIP_response_codes#4xx.E2.80.94Client_Failure_Responses

Internet resellers typically offer internet services cheaper than the retail arms of Bell and Rogers. The retail arms of Bell and Rogers fight back offering bundled services ... such as specialty TV sports channels, and/or possibly multiple cell phone bundles. If changing ISP or internet retailer such as to get a lower monthly rate, and one already has a home telephone and/or DSL line, co-ordinate with the new reseller ISP to do conversion so as to avoid 2nd installation charges. If changing from an existing telephone service, to be able to:

- transfer over one's existing number to be accessed via one's own ATA, and
- potentially retain only 911 service from jacks directly wired to the Bell Telephone company phone line before the modem and ATA,

keep the existing telephone service until you have your new internet telephone service provider (such as FreePhoneLine.ca or voip.ms) transfers your telephone number over, else you are likely to loose your existing telephone number.

On a VoIP service, one may also experience garbled voices when one does not have:

- a newer modem with quality of service (QoS) features to prioritize VoIP or
- with an older router, one's PC or standalone router, wired downstream of the OBi202 ATA, (NB: OBi202 will only pass thru data at a maximum of 30Gb/sec)
- an older router or modem/router before the ATA configured to pass through the 3 ports needed to be forwarded for ATA operation: [5060-5061 6060-6061 13000-13001]. (NB: If the modem router is maintained by your ISP, any changes you make will get overwritten with the next firmware update the ISP pushes out. Thus such ISP modem routers are generally used in BRIDGE mode, followed by a separate customer managed router. To put a Bell modem into bridge mode reference:

<http://forums.redflagdeals.com/please-sticky-how-bypass-bell-hub-use-your-own-router-1993629/>

If using an old separate router, user *adamm* reported Dec 12,2009 1:11 at:

<http://forums.redflagdeals.com/freephoneline-ca-free-local-soft-phone-line-lifetime-voip-821229/5/>

that QoS works great in then available Tomato firmware but not DD-WRT firmware available to retro fit to routers. Using QoS, he then allocated the IP address of his VoIP ATA to have 100% bandwidth priority and everything else gets the remainder, which in normal situations is most of the line throughput. See also: http://tomato.groov.pl/?page_id=69 Routers rated 1Gb/s and highest *CPU Freq* are highest performing.)

Setup (alias provisioning) instruction, of the OBi202 is walked thru by slides at www.obitalk.com .

As one registers for and buys internet based telephone services, many providers require one to verify one is human through receipt of an SMS message and then re-entering the same online.

That phone number contact is put into the customer database the provider maintains, though may be changed. Freephoneline.ca will not let you delete that number unless it is replaced with another Canadian telephone number. Google Voice may use that number for establishing your id for marketing purposes. For advertizers, personal cell phone numbers are excellent unique personal id tracking numbers of great value.

Google Voice setup is most easily done by you or your friend or a family member in the US. During setup, Google Voice checks and needs as part of its security, both:

- the requesting computer be connected to a US based ISP and
- a US telephone network connected telephone or cell phone, not currently linked to Google Voice.

Caution: A Google Voice number will expire, after issuing warnings, if the account remains inactive for about 9-12 months, without the owner calling out or logging into the web site. Google Voice gives free long distance calling to the 48 state plus 10 provinces but monitors your calls to harvest marketing info. Long distance rates elsewhere are competitive to very competitive, but requires pre-purchase of credits that expire in 6 months. Telephone numbers assigned by FPL and other ITSCs will similarly expire if not used. Most VoIP providers require pre-purchase of credits to use any service that has a fee. There are those on the web that attempt to break the security of ATAs to use or steal the pre-purchased credits. Thus it is prudent not to load more than you are willing to loose. Alternatively one may use a 3rd party calling card for such long distance for extra security. With the OBi202, one may change the admin password and update the firmware from time to time to have the ATA's operating system updated with the latest security patches. In any case, most VoIP providers will provide you a log of all attempted connections to your ATA, including those connecting attempting such scams.

Step by Step Procedure to change home based analogue landline telephone service to VoIP:

- 1) Buy an OBI ATA, likely an OBi202. The www.obihai.com web site provide links to economically priced units at www.amazon.com, though other retailers occasionally have promotional sales with prices even lower. Upon receipt of your unit, verify it appears to work via a test VOIP connection to Obihai, as documented by its quick setup guide. It is best to use a simple telephone rather than a wireless or other fancy telephone, which may generate interference.
- 2) Optionally get a new Gmail account and provision it with Google Voice, so that one can have free long distance beyond that provided by the internet telephone service provider providing you local Canadian area code internet telephone services. Be prepared to provide a unique (for privacy) *Recovery Email* address, and a list of US cities or area codes where you'd prefer Google Voice locate a free US local telephone number to you. Provisioning of Gmail with Google Voice needs to be done with both a US carrier registered phone and a US Internet Service Provider. If the phone is already linked to a Google Voice account, it will delink it and add it as a linked number to the new Google Voice account being created. Only US based

telephone numbers are acceptable to Google Voice as “*linked*” telephone numbers. As Google Voice receives a ring at your assigned US number, Google voice optionally concurrently rings all *linked* phones and forward transfers the call to the 1st *linked* phone that answers. Fortunately one can enable DO NOT DISTURB to linked numbers, and there is an interface that allows one’s internet connected computer to receive the call. It is through this interface that Obihai enables Google Voice connection of Obihai ATAs. Don’t worry about Google Chat. If you do the first step of getting your Gmail account, and plan to have a friend in the US sign it up for a Google Voice account, note that you need to pass to your friend your Gmail account’s: email address, password, and *Recovery Email* address. Once the account is setup, the personal phone number of your friend that was used to receive a validation code is linked as the destination of incoming calls and messages to your Google Voice number. Promptly then connect via <https://voice.google.com/settings> to revise your Google Voice account’s settings so as to not bother the phone used to setup Google Voice. I’ve done this by adjusting my Google Voice account’s settings under the following headings to be as follows:

- Phone Numbers: Do not disturb: Turn off message forwarding and send calls to voicemail
- Messages: Forward messages to linked numbers. Set box unchecked
- Forward messages to email. Move slider to the right.
- Calls: Forward calls to linked numbers Set box unchecked
- Get email alerts for missed calls. Move slider to the right.
- Voicemail Get voicemail via message Set box unchecked
- Get voicemail via email Move slider to the right.

(While doing the above you may also optionally choose to also do under:

- Phone Numbers: Linked Numbers: Click on the pencil to the left of your US friend’s number and place a note there that it is your friends number used to define your Google Voice Account.
- Linked Numbers: For redundant safety, one may choose to add a second US number, and configure it similarly to be totally passive. This way if one number becomes invalid for any reason a 2nd remains. Note that the number need not be that of a cell phone.
- Calls: Screen calls - Hear a caller's name when you pick up. Move slider to the right.
The call screening feature notifies the caller that you are using a Google Voice number. Google Voice may ask the caller to record their name the first time they call, and permit you to listen to message before answering the call and or the message will be transcribed and emailed to your Gmail address.
Incoming call options, Record(4), Conference call(5). Move slider to the right.
- Voicemail Let Google analyze voicemail transcripts. Move slider to the LEFT to disable for privacy.
- To receive calls incoming via one’s Google Voice number, the calls may need to be

forwarded to Google Chat, as per the instructions for within the obi troubleshooting forums.

) Perhaps one may simply delete one's friend's number in linked numbers, but I have not tried that as some dated Google Voice documentation indicated one must have a linked number, (ref: <https://support.google.com/voice/answer/165221?co=GENIE.Platform%3DDesktop&hl=en>). Google Voice does not show in its user interface either computer softphone or Obihai ATA connections as links. Google Voice goes through revisions. Each linked number, currently (as at 2017/7) must be a US number, and once had to be of one of 3 types: home, business or personal cell. One could use the same number for up to 3 different voice accounts so long as the number type was different in each account link. I am not clear whether such a restriction remains. Google Voice typically supports faxes. In the Pale Moon browser, a fork of Firefox, the new Google notifications bell doesn't work as pointer events are disabled. The style at: https://userstyles.org/styles/140385/fix-google-notifications-in-pale-moon?utm_campaign=stylish_stylepage re-enables them. First though one needs install the Firefox addon Stylish at: <https://addons.mozilla.org/en-US/firefox/addon/stylish/>

- 3) Email your chosen internet telephone service provider (such as FreePhoneLine.ca or voip.ms) that will provide you a local non US telephone number, to have written confirmation by the provider, the process which the provider will by your choice either:

- transfer over your existing local telephone number(s) , (typically costing ~\$25 each), or
- provide a telephone number with desired (613 or whatever) area code if the provider's automated online purchase utility, assigns a telephone number with another area code that works fine in your area, but is not yet recognized by your contacts as doing so,

and that if planning on using a fax machine there will be adequate bandwidth. (Cautions: 1) Rural long distance via FPL may not have adequate bandwidth - (a phone card may provide such). 2) as documented by OIT_Ray at

https://www.reddit.com/r/VOIP/comments/50tfo2/fax_with_google_voice_and_obi202/ Brother fax machines often do not function properly with VoIP. For many, the best way to receive faxes is to let them go to their FPL voicemail. The FPL system will then convert them into a nice PDF, which one can either set to forward to one's email (via one's voicemail settings), or pick up in one's online mailbox in one's admin area.)

- 4) Typically online, buy the VoIP unlock key (SIP number and pass code) likely receiving an optionally temporary telephone number with an area code you and/or others might not recognize as good for your locale. NB: Only one FreePhoneLine.ca (FPL) number is allowed per Fongo account. Each Fongo account requires a different email address.
- 5) Provision your Obihai ATA via the www.obitalk.com website automation. (Google Voice is very difficult or impossible to provision manually and if assigned a port, should likely be assigned to the 2nd telephone port on the OBi202. An exception would be if one needs to use that port for a dedicated local telephone number with a dedicated fax machine. In such a case one might have Google Voice ring with local number on the ATA's first telephone jack, your fax number on the ATA's second jack, and enable you to dial out on Google Voice by the escape sequence **3 indicating you wish to connect to the 3rd service provider number.
- 6) Upon you having confirmed your Obihai ATA now apparently working properly, optionally, (and typically costing ~\$25 extra), have your local internet telephone service provider replace

the number(s) they assigned by your existing telephone number(s).

- 7) If and when 6) is done, then re-provision your Obihai ATA via the www.ObiTalk.com website to put the revised local telephone number(s) on the ATA.
- 8) If not already done so, after a week or so of using your ATA without unresolved problems, optionally terminate your POTS. If also changing ISPs, do so through co-ordination with your new reseller ISP (for lower pricing). Once POTS is terminated, but if you still have DSL internet, optionally through a reseller, you may wish to co-ordinate typically with the municipal police, a 911 test, to see if your landline remains provisioned with the local 911. If left, the direct local 911 service will be available only at DSL former telephone jacks wired BEFORE the modem and ATA, but after a DSL filter/splitter.
- 9) For greater reliability, customization, privacy, security and/or lower long term costs:
 - power the modem, optional router, and ATA via a UPS (uninterruptible power supply)
 - change over to manual updating of the ATA software, as documented in the Jun 13th, 2017 11:28 entry of the Free Phone Line Canada user maintenance blog of Webslinger at: <http://forums.redflagdeals.com/freephoneline-ca-free-local-soft-phone-line-lifetime-voip-821229/411/> as soon as reasonably possible. The blog identifies many appropriate solutions and settings enhancements. [Here are 2 examples: to block SIP scanners and to block robodialers.] Reference at the bottom of his entries the links to his “*OBi200/202 Freephoneline setup guide*” and separate OBi200 and OBi202 discussion threads. Additional detail is in links at at <http://www.obihai.com/support>. Dial plans define valid numbers, and are well explained at: <http://voipstuff.net.au/DialPlans.html> and, and can be used to invalidate dangerous 900 numbers. Obihai charges ~\$10/year for continued use of their automated ObiTalk upgrade service and technical support beginning 12 months after the 1st provisioning of the ATA by ObiTalk, such as necessary for initial Google Voice provisioning, but makes updated firmware available for manual installation without charge. Such updates provide security and functionality fixes and enhancements.

Caution: When the analogue telephone services were upgraded to also carry digital signals years ago such as to support internet, appropriate measures to reduce the resulting increased electromagnetic field (EMF) radiation were not implemented. This includes retrofit of filters, shielding, and ground loop isolation. EMF can greatly increase inflammation in the body, and such is especially problematic during sleep. From personal experience, I have found being 5 feet away grossly insufficient, whether from Bell telephone lines or cable TV lines, or internal household water pipes to which we have erroneously innocently let the utilities ground their services to, whether or not one specifically subscribes to digital services. Such signals can powerfully resonate in building AC wiring and plumbing as part of LC circuits formed when a motor powered device is connected elsewhere in the building, a device such as a freezer or refrigerator. Before I isolated the source of the EMF back to the Bell telephone line grounded to my water pipe, I found my GE energy star refrigerator greatly amplified the EMF radiated from my house wiring. When I approached GE, their only solution was to offer to buy my refrigerator back. It is easier to design to avoid EMF rather than retrofit later to effectively shield against EMF. EMF is only partially blocked by any but the thickest of shielding materials. Part of the problem is what is termed “common mode” noise. Best practices include:

- In the case of electric wire rather than optical fiber telephone services:
 - Requiring that the services be provided by a shielded underground cable. (Except for multiline cables supporting many connections, above ground telephone are rarely shielded..)
- In the case of electric wire communications (whether cable TV or telephone)
 - Requesting that at the source pole, or near the entrance of the cable onto the building's lot, the cable be fitted with a lightening/over-voltage arrester with a connecting ground spike whose bottom end is driven into the earth at a level that remains below the water table in drought conditions. This ground connection will help prevent common mode noise present on the signal cable being conducted into the dwelling. A flat wide ribbon cable connecting the arrester to the spike is necessary to prevent high impedance to high frequencies.
 - Should a ground connection be necessary at or within the building, ensure the ground cable from the overvoltage arrester (ideally located just outside rather than inside the building) back outside tightly against the signal cable until the point where it needs to branch off to connect to the exterior water pipe valve servicing the building. Because normal wire provides much higher impedance to high frequencies, a shorter wider ribbon ground cable is most advantageous, as are ground spikes at the entrance to the building. Should an interior water pipe ground connection be required, ensure the connection is made only through a spark gap arrester, (fuse in telephone technician lingo), rather than just with a semiconductor or direct wire connection, and that it is done using with a heavy cable or better yet ribbon cable, routed away from sleeping areas and as far as possible way from areas where people may spend significant time, to the water pipe as it enters the building. This may require running the ground cable outside and back in again. The installers may object, because of the extra time they have to spend to do so, but building occupants' long term health and safety is more important than the installer objections. If their boss or other management also objects, note to these parties that their objections are acts contrary to section 217.1 of the Criminal Code of Canada, a section that defines his minimum duty to protect others, that electrical workers working around live signals suffer higher disease rates, and that legal "duty of care" requires higher standards of protection for members of the public, than are provided for workers.
- Routing all electric cables well away from areas where people spend significant time, especially bedrooms. EMF is not significantly blocked by most building materials.
- Choosing to have the demarcation point, inside a precision closing (*Faraday cage*) metal box that:
 - like a microwave oven has no open crack or hole more than 1/4" long in any dimension, and whose box is large enough to also accommodate DSL filters, a modem, an ATA, power adapters, and UPS (automated uninterruptible power supply based upon a large rechargeable battery). At the demarcation point and on each of the telephone ports of the ATA, a single DSL splitter filter is appropriate to

separate DSL and POTS signals, reducing the interference of telephones with modems. Note that:

- As at 2017/05 Bell Canada technicians normally install Comtest Networks (brand) model CPE-01V Compact POTS Splitters, but to minimize EMF and better protect the modem and ATA, the technicians have access to and may install/provide the improved Comtest Networks (brand) model NID-TJ-EMI POTS Splitters. These filters are also available from through their internal Bell stores, The latter filters are passive in design. DSL filters' method of operation are explained at http://www.epanorama.net/documents/telecom/adsl_filter.html. Comtest network filter cases off gas VOCs, so you may choose to just pop the circuit boards out of their cases before use with alternative insulation, Higher cost transistor based active DSL filter/ splitters, documented at https://en.wikipedia.org/wiki/Low-pass_filter may still be available that provide sharper frequency separation at the boundary frequency.
- It may be convenient to locate the ATA and its downstream DSL filters in a grounded copper screen enclosure elsewhere, allowing its indicator lights to be more easily seen, but that may require additional consideration of its need for UPS power and wiring.
- Is located just inside the home, that permits downstream cabling EMF exposures to be minimized. EMF exposure generally drops in proportion to the square of the distance from the cable.
- Is pierced by multiple sections of tubing or piping each a minimum of 2" long through which cabling is run. Any gap between the cable and its tube is filled by wrapping the cable section that goes in the tube with aluminum foil, and/or stuffing the gap with metal wool.
- Use only shielded cabling inside the building, especially for digital communications. Cat7 ethernet LAN cable is available that provides double shielding, of 4 pairs. Shielded underground telephone is available that provides a single shield around 3 twisted pairs.
- Use only shielded wire internet connections, not WIFI. If using WIFI, depower it when it is not in active use and especially at night and other sleep times. The WIFI of your router can be switched on and off by the browsers of any hardwired connected computer. Utilities renting router modems will usually provide the password. The device address is usually on the modem label. NB: If the modem is placed in a Faraday Cage as suggested above, its WIFI should be turned off as its WIFI signal will not reach devices in the home.
- Depowering GFIs, TVs, computers, digital devices, including those with digital displays when not in use. Some GFIs and many switching power supplies send EMF back through the power line. The EMF of switching power supply power adapters can increase substantially when they are located near each other on the same circuit.
- Minimizing exposures from being close to operating microwave ovens, items with motors, including hair dryers, lit flourescent lamps, most LED lighting with active power regulation. Such LEDs includes most lighting other than some full size 40W equivalent

LED bulbs, or holiday light strings

- Lacking access to a trifield meter, one can use an old AM pocket transistor radio as a crude detector of EMF. Tune the radio down low on the AM band below stations, and turn up the volume. Static will increase when the radio is brought near many EMF emitting devices.

Ideally all electrical equipment and electrical conductor based wiring needs to be designed to minimize EMF generation and propagation. Note that proper grounding of residual EMF with high frequencies requires a wide ribbon cable that will route high frequencies to ground without the high impedance of a narrow wire. Shielding should not have any gap or crack longer than 1/4" in any direction, and double shielded CAT 7 cable is now available for conductor based ethernet LAN wiring but shielding is not as effective as depowering the equipment. The placement of both equipment and wiring needs be kept well away from sleeping areas. Separate routers may be used to facilitate depowering of portions of one's home LAN cabling..

Potentially better yet is optical cable technology. While it can be used to eliminate EMF of copper based cables, EMF can still be a problem at each end of the cable where the conversion modules need be incorporated into shielding of the connected devices so as not to cause additional EMF radiation at the devices. Home plastic optical cable technology devices are still pricy.

Ottawa numbers corresponding to

211 - Community Info - 613 761-9076 <http://www.cominfo-ottawa.org/contact.html>

311 - City of Ottawa - 613 580-2400 <http://ottawa.ca/>

411 - Directory Assistance, White Pages - instead use the internet: <https://legacy.411.ca/>

Includes business, person, reverse lookup, add business

<https://411.ca/> Includes business, person, reverse lookup, but has a lousy interface

511 - Ontario Highway Conditions - 866 929-4257

611 - Bell Canada Repair - 866 310-2355

711 - Reserved in the US but not in Canada for Telecommunications Relay Services that permit persons with a hearing or speech disability to use the telephone system via a text telephone (TTY) or other device to call persons with or without such disabilities.

xxx - Telehealth Ontario - 866-797-0000 (In Cda except Ont, 811 is defined for Prov Health Svc)

Emergency **Police 613 230-6211** Non Emergency Police 613 236-1222

Fire - - - - - 613 232-1551 Ontario One Call before you dig . . 800 400-2255

Ambulance . . . 613 739-1918 Non Emergency Ambulance (same) 613 739-1918

So, with an OBi ATA, you'll want to add in its Physical Interfaces-->phone port-->digitmap

|211|311|511|611|811|310xxxx

And ditto add in Service Providers--> ITSP Profile (Freephoneline) General-->digitmap,

add something like: |<211:6137619076>|<311:6135802424>|<511:8669294257>

|<611:8663102355>|<811:8667970000>|<:866>310xxxx

<https://www.obitalk.com/forum/index.php?topic=6169.0> notes optimized maps provide connections faster