

MicroCell™ Informational Document for
Technical, Operational, and Troubleshooting Issues v2.1
by Otto Pylot



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The AT&T MicroCell is a very useful device when in-home cellular coverage is lacking or non-existent. However, it has developed a love/hate relationship with some customers. The purpose of this document is to hopefully explain some the technical workings of the MicroCell, which may help to explain why some customers have problems with their MicroCell's or their phones when attempting to connect.

There is a new version of the MicroCell, the DPH-154, and is the black model displayed above. It has a smaller footprint, but without the Computer and external antenna ports. Otherwise, as of this writing, the new model functions the same as the older, white model.

The MicroCell is a totally closed system so there is no access to modify or change settings like you can with a router. Only AT&T can modify the system and does so on occasion with updates automatically pushed to the unit (usually in the middle of the night). There are no announcements of what the updates are for or when they will be pushed out.

The MicroCell is primarily for voice. You can use it for data, but the speeds will be slow (typically up to about 3.0Mbps download) even though it uses 3G (HSPA) for throughput. Voice doesn't have the same bandwidth requirements that data does so if your download speeds are terrible (which they probably will be) on the MicroCell, voice should still be fine. That's why the recommendation is to leave WiFi on if you plan to use data as well. That way, data will be downloaded via WiFi and voice will be handled by the MicroCell. You data usage will also not go against your data plan if you use WiFi.

VoIP BASICS

VoIP (Voice over Internet Protocol) is basically converting an analog voice communication to digital communication, which is then transmitted from one point to another by way of the internet. This is not easy and takes a considerable amount of technology and cooperation among the various service providers to get it to work without any issues. Most of the time, we just pick up our phones, make a call, and not even think about what is going on behind the scenes to place that call.

The key factors that affect VoIP are as follows:

Latency - this is the amount of time it takes a voice packet to get from your location to its destination over the internet, and is usually measured in milliseconds (ms). The lower the latency, the better the call. High latency can cause calls to be dropped or affect the overall quality of the call. Causes of high latency can be many. Some may include the number of router hops (increases the danger of voice packets being incorrectly copied and sent thru), network congestion, low bandwidth, buffer management, data communication protocols (routing and switching), etc.

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Unfortunately, the end user has no control over these issues and they can be on-going or temporary.

Jitter – this is defined as a variation in the delay of received packets. Data packets are sent as a continuous stream evenly spaced apart. Due to network congestion, improper queuing, or configuration issues, the steady stream may be interrupted such that the delay between each packet can vary instead of remaining constant.

When the router receives the RTP (Real-Time Protocol) audio stream, it has to compensate for any jitter that is encountered. This basically means that the RTP has to be buffered and then put back together in a steady stream to be sent to the DSP (Digital Signal Processor) and re-converted back to an analog signal. This buffer is either called the playout delay buffer or the de-jitter buffer.

If the jitter is too large to be buffered adequately, packets are discarded which results in audio dropouts. Sometimes the dropouts are not noticeable if the DSP can insert packets that it thinks should be there (predictive insertion). If they are too large, audio quality deteriorates or the connection is dropped.

Jitter can only be fixed by your ISP.

Packet Loss – this is simply data packets that just get lost in transit. Not an uncommon event on the internet. Causes can include signal degradation, channel congestion, corrupted packets being rejected in-transit, faulty network hardware, faulty network drivers, or home network/wiring issues. Sometimes packet loss can be intentional by your ISP for operational management purposes.

Excessive packet loss can result in voice dropouts or loss of connectivity. Packets are transmitted using either TCP (Transmission Control Protocol) or UDP (User Datagram Protocol) protocols on specific ports designated by AT&T. The exact function of those protocols will not be discussed in this document.

Insufficient Bandwidth – it's nice to have a 50Mbps download speed but that is rarely a sustained speed (100% of the time). It will vary for lots of reasons and are not guaranteed by your ISP (the term usually given is "up to"). Most of the time one is close to that but variations will occur with sometimes very drastic speed fluctuations. All of which can affect the MicroCell voice quality and connectivity.

Your home network will also affect the bandwidth if you are sharing multiple devices that can all connect to the internet.

There are various applications that you can use to test for latency, jitter, packet loss, and speed. But these only take snapshots at that point in time. To get a more accurate determination on what is going on with your network, these

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determinations need to be made over longer periods of time and compared to the times of day to ascertain high usage windows which may coincide with issues. The following links are for two good tests you can perform to assess your line quality. Keep in mind that these are only “snapshots” for the time in which you run the tests but it may give you some useful information. To assess your true line quality you would need your ISP to perform these, or similar tests over a longer period of time:

The symptoms of poor line quality are as follows, and again, can only be corrected by your ISP:

Dropped Calls – calls may drop because of carrier related routing issues, but more often, calls drop because of packet loss related to failing or misconfigured network appliances. Insufficient bandwidth or other ISP related issues also might cause this.

Choppiness and Garbled Audio – These symptoms are related to firewall configuration or ISP connection issues. High packet loss and latency are often the culprits.

Robot or Underwater Sound – Firewall configuration and ISP issues can also cause these issues. The problem could be with the customer’s network or WAN connection.

Activation Issue – An extension in the customer’s firewall may be having issues traversing a NAT firewall. This is usually a rare incidence but a possibility.

<http://www.speedtest.net/>

<http://voiptest.8x8.com>

Summary of VoIP Test and Interpretation

1. Insufficient download speeds may impact inbound traffic including the ability to hear callers.
2. Insufficient upload speeds may impact outbound traffic, including the ability of callers to hear you.
3. Jitter measures the constant flow of data. A low jitter value shows a more consistent flow.
4. Packet loss measures internet connectivity and how accurately it is transferring data. Zero percent packet loss is desired for high quality VoIP.
5. MOS (Mean Optimum Score) is reported as part of the results summary. MOS measures the quality of the connection on a 5 point scale. Higher numbers indicate a better quality connection.

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VoIP Pass Criteria

MOS: Excellent 4.0 or greater. Good 3.0 to 4.0

Packet Loss: 0% (5% or less is desired)

Round Trip Time: <100ms

Jitter: <20ms (0-1ms radio quality, 1-5ms standard quality, 5-20ms broken sound)

Latency: <100ms

The criteria may change a little bit depending on the Data Center used for the test but basically, the lower the values the higher the line quality.

REQUIREMENTS

3G, 4G, or LTE-capable AT&T handsets

An AT&T SIM card.

Registered for myAT&T account. **NOTE:** if you are unable to register (registration info saved) or add phone numbers, it may be the browser version you are using. Try a different browser. For example, if using FireFox doesn't work, try Safari (if on a Mac), or if IE doesn't work, try Chrome.

Adding users on the Approved Users list may require you to turn off and then back on again the phone added so that it can "register" itself with the MicroCell after you type in the phone number.

Internet service. The MicroCell can work with any ISP, **EXCEPT SATELLITE and possibly wireless broadband due to latency issues.** Minimum download and upload speeds are 1.5Mbps and 256Kbps respectively. However, I think it really should be 3.0Mbps and 512Kbps (personal observation). A stable internet connection is essential.

The MicroCell must reside within an AT&T MicroCell coverage area:

1. The location has to be within an area AT&T is licensed to have coverage.
2. The network (for call routing) in the area has to be configured properly for the MicroCell.
3. All E911 services within the AT&T network have to be configured for MicroCell use.

Active postpaid account.

Prepaid customers can be approved users on an active postpaid customer's approval list, but cannot own the AT&T MicroCell device. In other words, the

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primary phone number has to be a postpaid account.

The MicroCell can support up to four voice or data users at once and can be shared with up to 15 UMTS mobile phones (but they must all be on the AT&T service).

There is no monthly cost to use the MicroCell unless you choose to opt for the unlimited in-home use plan. Pricing and rebates may vary from time to time.

You can have multiple MicroCells on one account at a single location to extend coverage.

NOMINAL SETUP modem -> router -> MicroCell.

The MicroCell needs to be no more than 18" away from a window with an unobstructed view of the sky and at least 2' away from a WiFi source. The MicroCell can be oriented in such a way that the side of the MicroCell is horizontal to the window if you are having trouble getting a good GPS lock. In other words, if you are looking at the lights on the front of the MicroCell, the right or left side is facing the window. The reason is that the antennas are located on the top of the pc board and sometimes a 90 degree orientation is enough to render GPS fixing variable. GPS connectivity must be maintained at all times.

If you need to use a GPS extension antenna to locate the MicroCell away from a window they can be found online. The connector is a MCX type. One adapter that is available is from L-Com (Part#CA-MPNFCN19) and allows one to connect a 70 Ft type high quality "N" cable to an external GPS antenna, but others that are not so expensive are available from Amazon and you can even find one specific for the MicroCell. NOTE: the external antenna input is no longer available on the new DPH-154 model (black version).

ALTERNATE SETUP modem -> MicroCell -> router (white models only)

This is usually reserved for troubleshooting because it bypasses the router altogether which eliminates one source of connection issues. You can use the connection if it solves your problem without any harm, but the MicroCell will have a direct connection to the internet and this configuration may adversely affect other connected network devices, especially their bandwidth. NOTE: the black DPH-154 model does not have the Computer port anymore so you will not be able to use the MicroCell as a pass through device to your router. However, the modem -> MicroCell connection is still a good way to test your connection if you think it may be a router issue.

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MINIMUM ROUTER REQUIREMENTS

DHCP enabled

Ports that must remain open (public and private):

123/UDP - for NTP traffic.

443/TCP - for HTTPS over TLS/SSL for provisioning and management traffic.

4500/UDP - for IPsec NAT Traversal (for all signaling, data, and voice traffic).

500/UDP - for IPsec Phase I prior to NAT detection, after which 4500/UDP is used.

IPsec Pass-Through is enabled

Block Fragmented Packets is disabled

NAT duties handled by only one device if you have a separate router and modem (gateway)

Double NAT Workaround:

If you can't disable NAT on your router or modem you may be able to bypass it by port forwarding port 45631/TCP in your router to the DMZ (courtesy of pspershan). See

<http://inmethod.com/forum/posts/list/908.page> for detailed instructions. NOTE: this is really only a workaround for a double NAT as port 45631 is unassigned and is not guaranteed to work in all circumstances.

OpenBSD 4.9 router notes: for those of you who use OpenBSD, some issues have been reported when using the 192.168.100.0/24 subnet. You may want to try 192.168.1.0/24 and see if that corrects the problem.

U-VERSE BASICS

AT&T's High Speed Internet Access (HSIA) service is either ADSL2+, which uses your existing copper-based lines, or VDSL, which is a combination of fiber and copper, to bring HSI to your premises. The use of either technology is dependent, in part, on what is already in your existing neighborhood or what AT&T (or another provider) has upgraded the neighborhood to.

VDSL is distance limited like DSL, but uses a fiber optic connection part of the way to increase speed and bandwidth. The final connection to the premises (last mile) can, and usually is, over the existing copper lines.

FTTN - Fiber To The Node (or Neighborhood), FTTP - Fiber To The Pole (or Premises), FTTC - Fiber To The Curb, or FTTH - Fiber To The Home, are all methods of delivering VDSL to the home, and all depend on some sort of neighborhood box called a VRAD (Video Ready Access Device). However, the VRAD is more of a rack of

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cards that provide connection to the home than it is a “device”. The cards could be for fiber connection or different versions of VDSL2 connection cards.

Running fiber from the CO (Central Office) to the VRAD isn't cheap, and neither are the VRAD's, so that's why some neighborhoods don't have VDSL service because it all depends on what kind of ROI (Return On Investment) your particular service provider expects and if deployment is cost effective.

Either type of service works well with the MicroCell. But VDSL is a bit more temperamental and less tolerant of line faults like bridge taps and AM interference, and thus is a bit more difficult to get installed correctly for the MicroCell.

The RG (Residential Gateway) chosen is dependent upon the type of VDSL that you have and the distance from the VRAD. A bonded pair connection is used if your premises is between 3000' and 5500' from the VRAD (that's cable length) or a single bonded pair is used if you are 0 – 3000' from the VRAD. The distance determination is totally up to the discretion of AT&T.

ADSL2+ modems won't work with VDSL2 connections and vice versa.

As of this writing, the RG's installed for U-verse services are:

Motorola NVG 510 for ADSL2+ - the newest offered but can have problem with marginal lines and has had DNS issues.

Motorola NVG 589 – VDSL2 for those who have a bonded pair.

PACE 5031 - are supposed to be the “best” for VDSL without a bonded pair (they can also be used for ADSL2+ but are not recommended).

2Wire 3801 – VDSL2 of choice for customers between 1900 and 3000'.

2Wire 3800 – VDSL2 for shorter distances than the 3801. The 3801 and the 3800 are pretty much interchangeable but the 3801 does better with weaker signals.

Pace 4111n – currently is only certified for ADSL and not ADSL2+, but there may be a new firmware upgrade that will give it dual mode capability in the future.

RG's are constantly evolving with firmware/software upgrades so the above is just to give you an idea of what is involved in getting the MicroCell to work well with U-verse.

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WIRELESS HOME PHONE (WHP)

The Wireless Home Phone (WHP) is a standalone device that allows the user to use a traditional corded/cordless handset to make calls. It uses the AT&T Mobility Wireless Network which is the cellular GSM network (850/1900MHz). If you have decent cellular coverage in your home, then the WHP will connect to the closest tower. If not, you can use a MicroCell to make that connection.

It may help to think of the WHP as a cell phone. It is activated with a SIM card, is considered Mobility service, and appears as just another line on a customer's Mobility bill. It is not billed as a "wired/landline" product. In addition to a standalone plan, WHP can be added to Mobile Share or grandfathered Family Talk plans. Since WHP has no data or messaging capabilities, it won't impact the data usage for these types of "shared data" plans. The WHP is not a VoIP device.

The current model of WHP is the WF720. There is a new WHPI model (Z700) that is being offered in specific markets as a pilot. The new model has not been tested with the MicroCell because it is intended for the customer base that cannot use a MicroCell. It will include data and will work similarly to a Mi-Fi device in that it will provide the customer with their home internet. Because it would replace the customer's home internet, they would not have broadband that would be compatible with the MicroCell. The MicroCell is not compatible with wireless broadband.

The WHP is a closed device like the MicroCell so there are no configuration options available. Without the use of the MicroCell, the Signal Strength LED will be solid green, yellow, or red to indicate the quality of the signal. When connected to the MicroCell, the Signal Strength LED will blink green. To connect to the MicroCell, the WHP needs to have its phone number added to the Approved User List of the MicroCell. The WHP has no keypad, touchscreen, or any other means of dialing a phone number or placing/receiving calls. It needs to have a corded/cordless phone plugged into it instead of having the phone plugged into a traditional phone wall outlet.

WHP call quality can be affected by the same factors that affect the MicroCell call quality when the WHP is using the MicroCell to make its GSM connection.

GoPhone (pre paid account).

If you had registered a MicroCell with a post paid account, and then changed it to a pre paid account, your phone will probably still connect to the MicroCell for a period of time. However, if you ever need to deactivate/reactivate your MicroCell or attempt to re-register it, you will probably not be able to do so because your account information will eventually "catch up" to your MicroCell account and activation will

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fail. The MicroCell requires a post paid account, so there are some of you who may encounter your phone not connecting to the MicroCell and that's why. There is nothing that can be done other than switch back to a post paid account. However, a pre paid account can still be added to the Approved Users list.

ADT HOME SECURITY

There are quite a few reports of the MicroCell interfering with the ADT Home security system. The answer is quite simple. ADT happens to use the same frequencies that AT&T does (850 MHz and/or 1900 MHz) so we often see interference when the ADT system and MicroCell are in close proximity. The frequencies allowed are dictated by the FCC license for that area and provider. There is nothing that can really be done other than keeping the MicroCell and ADT transmitter as far apart as possible (at least 50') but that is no guarantee that interference still won't occur. This can become very troublesome if you have a MicroCell and your nextdoor neighbor has an ADT transmitter on the same side of their house that your MicroCell is on. There are three different antenna kits that ADT offers, 15', 25' and 50' that you can use but they are a bit pricey. AT&T owns the spectrum so ADT is the one who needs to comply or offer a transmitter that uses frequencies other than AT&T's 3G or 3G HSPA.

WiFi CALLING

WiFi-C is essentially offered for the same reason that the MicroCell is. It is intended to patch holes in coverage, primarily in your home. It is not intended as a 100% replacement for cellular. The phone should connect to WiFi-C whenever cellular strength is weak/unsteady or non-existent and a stronger WiFi connection is present.

HD Voice only matters for the purposes of handing-off to a tower. However, a 2G/3G device (i.e. the MicroCell) isn't capable of HD Voice so calls will not hand off from WiFi-C to the MicroCell (or a 3G connection) because the 3G tower cannot "see" the WiFi call. This is due to network/technology structuring.

So, if you are in a mixed environment and want to use WiFi-C in home, your only option is to enable Airplane Mode to turn off the cellular radio and force the phone to connect to your WiFi network. AT&T will probably not change the preference for cellular over WiFi because they are selling a cellular service, not a WiFi-C service. If there is anyway to change the preference it will have to come from Apple. Personally I don't think Apple will change it either because it's just not a priority for them. According the AT&T, if you have wireless access points in your house and move from point A to point B, the WiFi-C call will drop because your wireless access points don't have handing off protocols between them. Towers can hand off to each other because they are connected to each other by a base controller. I'm not

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convinced that this is true in all cases of WiFi-C. Even though your wireless access points don't communicate (hand off) directly with each other, they do go thru your router, which to me, would act as a base controller. My guess is that your mileage will vary on this one depending on how you have your wireless network setup, distance between access points, and other wifi-related issues.

The strength of the WiFi signal needed for successful calls is probably close to the same as it is for cellular calls. If the signal strength gets close to -90dBm calling may be iffy. At -95dBm to -100dBm or lower you will probably start to drop calls or lose them altogether. Any issues that affect your WiFi will affect WiFi-C so keep that in mind.

WiFi-C for Apple devices use ports 500 and 4500. Those are two of the same four ports that are required for the MicroCell. When there have been port issues with the MicroCell, port 4500 seems to be the culprit in a lot of cases. So, if you experience MicroCell issues and port 4500 is blocked or is having issues, you may have WiFi-C issues as well. Unfortunately, port issues can only be corrected by your hardware and/or the ISP. AT&T has no control over that.

iPhone models earlier than the recently released iPhone 5SE will not be able to take advantage of WiFi-C either because they can't be provisioned for VoLTE (Voice over LTE) which is a base requirement for HD Voice. Both terms have been used interchangeably so the distinction between the two is probably only minor, if at all.

WiFi-C is also offered on some of the newer Android-based devices as well.

Of course all of the above is from AT&T so it can change without notice, and I'm sure there are going to be instances where actual experiences will differ. Please note that you may have to upgrade your SIM card for your WiFi-C capable phone to use that service. The upgraded SIM card should be free and any corporate store can do that for you if you don't want to wait for AT&T to send you a new one.

As an example, I setup WiFi-C on my iPhone 5SE when I first purchased it to test. The following are the steps I needed to do at that time. The sequence may have changed somewhat since then due to iOS upgrades but you get the basic idea:

Within range of a MicroCell that the phone is registered to:

1. Enable WiFi-C on the phone.
2. Enable Airplane Mode (which apparently turns off WiFi).
3. Enable WiFi and you should see AT&T WiFi and the WiFi signal strength.

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To re-join the MicroCell:

1. Disable WiFi-C on the phone.
2. Disable Airplane Mode.
3. Turn off the phone and then back on again so the phone can register to the MicroCell.
4. M-Cell should be displayed.
5. Turn on WiFi.

So for now, if you want to use WiFi-C in home you need to either:

1. Disable the MicroCell altogether and sell it.
2. Enable Airplane Mode so that your phone can only connect to your WiFi network.
3. Remove your phone number from the MicroCell. If the phone number used to register the MicroCell is the same as the WiFi-C capable phone, then the MicroCell will probably have to be deactivated and then re-registered to another non-WiFi-C capable phone on the same account (provided that phone is a post paid AT&T account). There is some disagreement on whether this works easily or not. I haven't actually tested that myself so if anyone else has, please let me know.

Remember, you cannot hand off from WiFi-C to cellular (2G/3G) and vice versa, and cellular will always be the preferred connectivity protocol when the signal is stronger and/or more stable.

Calls made over WiFi are treated like a regular call so you can call to any phone be it cellular or landline.

NOTE on WiFi Assist (Apple iPhones)

This is a feature that is enabled by default (at least it used to be). From Apple, "With Wi-Fi Assist, you can stay connected to the Internet even if you have a poor Wi-Fi connection. For example, if you're using Safari with a poor Wi-Fi connection and a webpage doesn't load, Wi-Fi Assist will activate and automatically switch to cellular so that the webpage continues to load. You can use Wi-Fi Assist with most apps like Safari, Apple Music, Mail, Maps, and more.

When Wi-Fi Assist is activated, you'll see the cellular data icon in the status bar on your device.

Because you'll stay connected to the Internet over cellular when you have a poor Wi-Fi connection, you might use more cellular data."

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This may or may not cause issues with the MicroCell. We recommend keeping WiFi enabled on your phone so that data is handled over your WiFi connection and voice handled over cellular. But with WiFi Assist enabled, there could be issues. So if you are having issues, disabling WiFi Assist (which has nothing to do with WiFi-C) may correct them. I personally don't use WiFi Assist and make sure it is still disabled after an iOS update.

ETHERNET CONDITIONS

The MicroCell needs to be physically connected via an ethernet cable to the router or gateway at all times. PowerLine Adapters can be used but they may not work because house-wiring conditions can be variable due to age, installation, etc. Newer homes and condos may have pre-wired RJ-45 or 8P8C connectors in-wall. These should work but proper installation, which would be continuous length of wire (no intermittent adapters), type of wire used (twisted vs solid core), degree of wire bending, wall board nails touching the wire, and proper wiring to the connectors will all affect performance. The MicroCell apparently is more sensitive to grounding and voltage fluctuations than a router is so any variation may cause the MicroCell to lose connection and the only way to re-establish connectivity is to restart the MicroCell and/or the phone. If you are using a wireless router and want to locate your MicroCell in a different location in your home that prohibits hard-wiring it to your router, you may be able to use a wireless repeater next to the Microcell and hard-wire the Microcell to the repeater.

The MicroCell does generate some heat at the top so give it plenty of ventilation and try not to put it in direct sunlight when placing it next to a window.

The MicroCell can be used at locations other than your home (summer house for example) as long as the primary account phone number is the same and you change the address of the setup page to reflect the current physical location of the MicroCell (for GPS confirmation and initialization).

GPS LOCK

The MicroCell needs to maintain a GPS lock at all times. This is for E911 services and for timing purposes to allow the data packets to synchronize between the MicroCell and the nearest tower for handing off calls. The MicroCell does not have a very good atomic clock embedded so it needs to do this for timing the packets.

AT&T performs maintenance on their network usually on a nightly basis during the hours of minimal usage, usually very late at night or early in the morning. GPS location is verified by using the local tower and the NWL (Network Listen) protocol. If NWL fails for any reason, then the MicroCell uses the standard GPS scan to confirm location. If that fails, connection is lost until it can be re-established by

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either re-booting or calling support if the reboot or deactivating/reactivating doesn't work.

GPS also allows the MicroCell to choose which frequencies are licensed by AT&T that can be legally used in the area. Since the unit operates on the same frequencies as used by the towers, it must operate within the licenses owned by AT&T but these licenses can vary from region to region.

GPS signals are broadcast on a 1.5GHz channel which can be absorbed by wood and metal. So moving the unit a couple of feet to either side of a window may make a difference in GPS lock. An external antenna can be used if optimal window location is not possible. The external antenna input on the back of the older, white MicroCell uses an MCX type connection. Good antennas can be found on Amazon with the prices varying from inexpensive to fairly expensive.

Speaking of E911 calls, any E911 call from a mobile device should be done with the complete 10-digit phone number, not just 911. The reason for this is call delay. On a landline, the 911 operator has your exact GPS coordinates instantly, and even if you can't speak, but leave the connection open, they can roll emergency vehicles to you immediately. Mobile devices and VoIP calls (**the MicroCell is a VoIP device**) are usually routed first thru your local Highway Patrol or State Trooper's 911 dispatcher, and then that's routed to the local 911 operator. That's usually very quick but there can still be somewhat of a delay. The landline (voice) dispatcher has instant access to the GPS database for all calls, and mobile calls may not have the instant access like the landline operators do. Dialing the 10-digit number is the same as using a landline. This is getting better as more calls move away from landline and go to mobile but it is something to consider for use in-home. The downside is that the 10-digit number is based on your area code and if you are out of your area code you have no choice but to dial 911.

INITIAL ACTIVATION

When the MicroCell first boots up, the unit gets a DHCP license, syncs with network time over NTP, and then does a DNS query for xxxxx.wireless.att.com. Once successful, it talks to that server over HTTPS (TLSv1) for a while and then immediately starts an IPsec VPN with xx.xxx.xxx.193.

From AT&T: *The address where the MicroCell is physically located will be verified via the online registration process prior to use. If buildings, landforms, or other obstructions block satellite and/or cell tower wireless signals to the MicroCell, AT&T may be unable to verify the location of the device. If AT&T is unable to verify that the physical address of the device is located within an AT&T authorized service area, the MicroCell will not remain in service*

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Once that is established, the MicroCell gets the GPS signal, confirms that with NWL, notes the local tower signal, and adjusts its internal transmitter power. At the same time it is updating any firmware changes it needs to do (that's why you may see it reboot a couple of times or take a bit longer to complete the activation process), building a handoff list of macrocells (towers) that are in range, and collecting information about which frequencies are active in proximity. The greater the received signal strength from the local tower, the lower the 3G transmitter power from the MicroCell to your phone. The reason for this is so the MicroCell won't interfere with the local tower signal. That's why if you are really far away from a local tower, your MicroCell's transmission power will be increased with the resulting better reception on your mobile phone. However, the closer the tower(s) are, the opposite effect happens. **NOTE: The MicroCell does not need a local tower to activate, only GPS lock.**

To complicate matters, the individual mobile phones also adjust their transmission strength in relationship to what it receives from the MicroCell, and some phones are just better at this than others, hence the variability between phones when connecting, and staying connected to the MicroCell. For some phones, increased battery drain may be experienced because of this.

Changing the location of the MicroCell in your house may alleviate any tower issues if you are in a particularly strong, or weak, area. Try to find the "sweet spot" if you can. This may work for some if you are having issues related to tower strength.

Continuously re-starting the MicroCell (power cycling) repeats the activation process detailed above, which shouldn't change anything if you haven't moved the MicroCell to a different location, but that's no guarantee that transmission power of the MicroCell and/or mobile phone will stay the same.

The MicroCell operates at 850 or 1900 MHz 3G depending on the FCC licenses that AT&T has available at your GPS coordinates.

HANDING OVER

There are basically two types of handover that happens on cellular networks, soft and hard handovers.

In soft handovers, the phone is continually talking to multiple macrocells (towers) at the same time, so the transition is seamless because you are already connected and communicating with the towers you are going to be handed over to.

In hard handovers, the phone will literally drop the active connection and transition to another connection. The handover can be further complicated if it is a vertical

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handover, which happens between network technologies. That is, from UMTS (3G) to GSM (2G), 4G to LTE, and vice versa.

Virtually all femtocells are hard, vertical handovers. That's why a local tower is necessary so that the MicroCell can build a list of the local towers, hopefully both 3G and 2G, and pass that on to the phone in the form of a neighbor list.

So, when you leave your house and are on a call, a hard handover (probably vertical) takes place and if your tower is close, the call doesn't get dropped (in theory). The opposite is true as well. However, if the tower closest to you is far away, handing over is going to be very difficult.

This is one of the most frustrating aspects of the MicroCell (and femtocells in general). If your local tower is far away, you'll probably get excellent coverage in-home, but handing over when you leave your house will be problematic. On the other hand, if you have a tower or towers close by, handing off will be great but in-home coverage or handing off to the MicroCell may suffer due to MicroCell transmission strength.

TECHNICAL INFORMATION

The 3G labeled MicroCell uses a 400MHz ARM11 processor. The newer MicroCell's (DPH-154, black model) processor is not confirmed at this point in time.

Range is about 5000 square feet. But that is dependent in part, on how close or how far away you are from a tower. Generally speaking, if a tower is within 2 miles of your home, coverage should be ok.

UMTS (Universal Mobile Telecommunications System), which is also called WCDMA, is the most widely used 3G standard for mobile phones and is carried on a 5MHz carrier signal. UMTS data is limited to 384 Kbps but data throughput and speed is increased by enabling HSPA+ (which AT&T calls 4G). Some iPhones may indicate 4G when connected to a MicroCell (M-Cell displayed) but that is just indicating that the iPhone is detecting the 3G with HSPA+ enabled.

LTE is operated on the AT&T network at 700 MHz. The MicroCell only operates at 850 and 1900 MHz.

AT&T's 3G offers data up to 3.6Mbps alongside voice which is pretty much what I saw with my iPhone 5 SpeedTest when I tested it in 2013..

HD Voice, while it doesn't pertain to the MicroCell specifically, does come up from time to time in the forums so I thought I'd briefly mention it here. HD Voice, which AT&T will call VoLTE, is basically wideband technology using the frequency range

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that is more compatible to human hearing, which is 80Hz – 7KHz at about 16,000 audio sample per second. Current mobile phone technology uses a frequency range of about 300Hz – 3.4KHz at 8,000 audio samples per second. In theory, 3G (HSPA+) can handle HD Voice but AT&T will in all likelihood carry it on LTE 700MHz frequency. The MicroCell only uses the 850 and 1900MHz frequencies.

One of the downsides of HD Voice, at least in initial testing, is that it can really deplete your battery rather quickly. Hopefully that will be resolved as it begins to roll out. The current 3G technology is imbedded on the base band chipset in the MicroCell so upgrading the 3G labeled MicroCell's to 4G/LTE is not possible without a hardware upgrade.

AC Adapter

The a/c adapter is model no. 3A-153WU12 (for my white, DPH-131). The power requirements for the MicroCell are fairly specific and an adapter that is starting to go out can cause all kinds of problems, mostly lost connection to the AT&T servers.
Input: 100-120V, 50-60Hz, 0.4A

Output: 12V, 1.25A, positive polarity 

The newest MicroCell, DPH-154 (black model) is slightly different:
It's a switching adapter, model no. DSA-12PFA-09.
Input: 100-240V, 0.5
Output: 12V, 1A, positive polarity, Level 3, Efficiency Level V

Testing the ac adapter: test the output of the adapter using a voltmeter. Touch the leads of the voltmeter to the outside of the plug barrel and the other tip to the center of the plug. The reading should about 16 VDC with no load (the adapter should be plugged into the wall outlet but not the MicroCell). The output voltage measured should be higher than the rated output of 12 VDC because there is no load on the adapter while measuring output. If the output voltage varies from 16 VDC by more than +/- 0.5 VDC, then the adapter could be faulty. Replace the adapter with one of the same rating as the original adapter (courtesy of Avedis53).

IMSI (International Mobile Subscriber Identity) Number

Your phone will send an IMSI number to the current network while registering which allows the network hardware to recognize the subscriber (phone). This number is sent as rarely as possible to prevent interception and is sometimes sent as a TMSI, which is a temporarily generated code for the mobile subscriber identity. The number is on the SIM card (for phones that use them) and is used by any mobile network that can interconnect with other networks. CDMA networks (Verizon for example) have their IMSI codes embedded.

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AT&T only supports 310410 (310 = USA and 410 = AT&T). The number is stored as a 64-bit field and is converted to a 15-digit number based on MCC (Mobile Country Code), MNC (Mobile Network Code), and MSIN (Mobile Station Identity Number). So, the MCC is 310 and the MNC is 410, etc. for AT&T.

The IMSI number is converted by AT&T's IT Department to a phone number. But AT&T doesn't have a list of all of the possible IMSI numbers worldwide because that would be very expensive to maintain. The MicroCell is an IMSI based system which is how it ties into the AT&T network and forces conversion to actual numbers.

What that all means is that if you buy a non-AT&T branded phone, a jail broke phone, or one that is not currently being sold domestically, it may not work with the MicroCell because the IMSI number is not recognized.

IMEI (International Mobile Equipment Identity) Number

This is not to be confused with the IMSI number. It is a 15-digit number that is unique for each device. The IMEI number is provided by the carrier when you sign up for service. It is the phone's registration number and is also used for tracking phones or blocking stolen phones. The question has come up before, "if I have an AT&T provided IMEI number, why doesn't my phone connect to the MicroCell"? The answer may be the IMSI number.

CONNECTION ISSUES

This can be a very difficult and frustrating area because a single issue may be caused by different factors so there is not always an exact cause and effect when attempting to resolve a problem. Common "fixes" may resolve different issues. Hopefully the above technical and operational explanations will shed some light on why there are issues for some people and how difficult it can be to identify and correct them.

First of all, the MicroCell is a totally closed system, physically and firmware-wise. There is no way to access the firmware to modify the system to error check like there is for a router. Physically, the MicroCell has anti-tamper clips on the inside and once you open the unit, the clips disengage and unless you can get them back in the exact same place when re-assembling the unit, the MicroCell will be rendered useless. There are instructions online that show how to open and successfully close the MicroCell but there is absolutely nothing inside that is going to be of any use to the user and/or support. There is an LED light pattern on the pc board but the meaning of the blinking sequence is meaningless to all except maybe an engineer.

If the MicroCell gets knocked over (the cat ran into it) and you notice a slight rattle inside when you pick it up, the anti-tamper clips may have come loose and the unit may be damaged and not work correctly.

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All of the suggested troubleshooting techniques are assuming that the MicroCell is setup properly and did work at one time. The suggestions work for most, but not all of the time. Because of the wide variety in home LAN setups, equipment, macrocell (tower) locations, etc. some issues may be more difficult to resolve than others. The use of powered or managed switches can cause issues if they go into standby when no traffic is detected, or some sort of load balancing or priority is initiated, resulting in loss of connection and a restart necessary.

MicroCell Service Area Outages

The causes for this are many and varied and are beyond the scope of this document so I won't go into that here. An outage can be localized or regional depending on the cause and can be fixed quickly or go on for a week or more. More serious outages can have a cascading affect and reach across different MicroCell Service Areas over a period of time. Support is usually the last to know about the outages so when you experience a sudden loss of connectivity for no apparent reason, and can't correct it with any of the troubleshooting procedures found here, it's best to PM ATTMobilityCare with your issue, what you have done to correct it, any trouble ticket numbers assigned to you, your account information, the best way for AT&T to contact you, and most importantly, your location. Individual connectivity loss can happen at any time, but if Support starts to see a pattern with the same issues reported from different locations, the Network Engineers should be notified and with the location info, it may help them to isolate and correct the problem quicker. The outage may also affect other services such as the myATT account page so that attempting to deactivate/reactivate your account, or modify your account in any way may not work.

Once the outage is isolated and corrected, not all MicroCell Service Areas will come back online at the same time because it will take time for the fix to propagate thru the system, and there may still be localized areas that will take a little more work to identify and correct. You may have to perform a **Complete Reset/Activation** for your MicroCell if simple power cycling or any of the other procedures listed under Blinking Green 3G Light do not work

Power Light is Red or Not Lit

Obviously a power problem, especially if none of the lights are on. Check the power cable to make sure it is firmly in place and the same at the outlet. Check the outlet with a circuit tester or a lamp to make sure it is ok. If the a/c adapter feels warmer than it should (subjective I know but if it's too hot to touch....) you may want to replace it with an ac adapter that has minimally the same specs as listed above.

Check the outlet itself or try another outlet to see if that works.

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If the Power Light is red, that could mean that the MicroCell's power supply has failed and the unit will probably have to be replaced. See ac adapter section.

Ethernet Light is Flashing

No ethernet connection or connection is bad. Check the ethernet cable to make sure it is firmly in place at both ends, is not severely bent, or frayed anywhere (the cat chewed on it). Check your cable or DSL line connection. If all of your other devices can connect with no issues to the internet, then it is something specific to the MicroCell.

Power cycle the MicroCell and/or the router to see if connectivity re-establishes.

Perform a hard reset on the MicroCell by disconnecting the power to the MicroCell and then holding in the reset button on the back for about 30 seconds while restoring power.

If you have a separate router, do a priority connection (as discussed previously) to the gateway and see if that works. If it does, then it may be an issue with one of the router ethernet ports. Try a different port.

Check with your ISP and make sure that they aren't blocking any of the ports listed above. I have seen cases where an upstream switch was faulty, even though the connection to the ISP was fine, and only after diligent digging around by the ISP was the switch corrected. AT&T has very little control at times on connection to their network so that's why they list which ports need to be open all the way to their servers.

GPS Light Flashing

Make sure that the Power and Internet lights are solid green. Otherwise, try to resolve those issues first.

The GPS light doesn't indicate whether or not the MicroCell has been able to achieve GPS lock. It's just an indicator that shows whether a location check has been started or completed. When the GPS light is flashing, the GPS check has been started and is in progress. When the GPS light is a solid green, the location check has been completed. There is no indication of whether that location check has passed or failed by looking at just the GPS light status.

Orient the MicroCell as suggested under Nominal Setup. I have mine placed on a small stand so that the top of the MicroCell is about two or three inches below the window sill. This gives the top of the MicroCell maximum exposure to my North facing window. We have a metal roof and have no GPS issues at all with this

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placement.

If you live in a rural area or a relatively new area, AT&T may not have your address in their locational database that matches your GPS coordinates. If you can't get GPS lock, then E911 can't be confirmed or tower location for handing off, and activation won't take place. E911 is an FCC requirement.

Keep in mind that the GPS light may be a solid green even if it fails but you should receive an error message from AT&T indicating that location verification has failed.

Make sure your address is correct on the Activation page, which is found on your myAT&T account. AT&T may have to update their database or make some changes to your account at their end and that will require a call to phone support or a PM ATTMobilityCare.

<https://www.att.com/olam/passthroughAction.myworld?actionType=Manage>

3G light Flashing Red or Green

This is one of the most common issues, of which there are many causes. Basically, you have no connection to the AT&T servers, Activation is still pending, Location Verification has failed, or there is a hardware/update failure.

A blinking green 3G light indicates a failed update, a hardware failure, or something is blocking access to the AT&T Mobility Servers.

A blinking red 3G light indicates a failed location check.

If Power, Internet, and GPS lights are solid green, and you've tried the individual steps such as power cycling (MicroCell, router, etc), de-registering/re-registering, hard reset etc., try the following steps in order to perform a **Complete Reset/Activation** and see if that corrects the issue:

1. Turn off your phone
2. De-register the MicroCell on myATT and log off
3. Perform a hard reset of the MicroCell. Disconnect the power to the MicroCell. Hold in the reset button and re-establish power and keep the reset button held in for about 30 seconds
4. Re-register the MicroCell on myATT
5. Wait till the registration and updates (if any) finish
6. Turn on the phone

What you are doing is setting the MicroCell back to its default settings so that it, and the phone, have to go thru the entire Initial Activation process. This may be particularly useful if there has been a MicroCell Service Area outage and a simple power cycle doesn't re-establish a stable connection, or an update was pushed to

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correct a phone-specific issue.

There has been a reported firmware bug that caused the MicroCell to delay the GPS lock, which resulted in a flashing red 3G light on a perfectly functioning MicroCell. This usually happened during the nightly location checks. The MicroCell would eventually get GPS lock but it became “confused” which caused the 3G light to flash red with a location error. Unfortunately this can be a recurring problem so Support should be contacted.

Setup an alternate connection if you have a separate router/gateway. If that works, then it’s probably a configuration issue with your router. Make sure your router’s firmware is current or that any changes haven’t been made (automatic updates). If the above suggestions don’t work, then you may have to look at your router settings. The minimum requirements are listed at the beginning of this document. If you don’t know how to check the listed parameters, you’ll have to contact your ISP or the router’s mfr. AT&T support probably won’t be able help you much because there are just too many different routers and router/gateway combos available for them to keep current on. Besides, it’s technically not their responsibility for the operation of your equipment to make sure it adheres to the basic requirements needed for proper operation of the MicroCell.

I have my router set for port forwarding to a static IP address based on the MicroCell’s MAC address, using the ports listed above, which has resulted in rock solid performance for my MicroCell even with planned and un-planned power outages. In theory, port forwarding shouldn’t be necessary but it does make for a more reliable connection especially if you have power outage issues. If you purchased a second-hand MicroCell (eBay for example) the MicroCell has to be deactivated by the original account holder or you won’t be able to register it and activate your account. The reason for this is because the serial number of the MicroCell is tied to the current account holder’s information. If that’s the case, AT&T support can deactivate the account, but that can take time, probably because they have to make sure that it’s a legitimately purchased second-hand MicroCell before deactivating the account.

Phone Not Connecting to the MicroCell

The causes for this can vary but if the MicroCell looks operational (Power, Internet, GPS, and 3G lights are solid green), then it’s probably the phone.

Add an AT&T phone to the Approved Users List and see if it can connect to rule out your phone.

For the iPhone, Reset Network Settings and see if that works or whatever the equivalent is for other phones. Keep in mind that Reset Network Settings may result in a loss of passwords, and other settings so make sure you have the information written down someplace so you can quickly re-enter it.

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Call Support because they can sometimes tweak account settings on their end that improves connectivity.

Non-connectivity could be an IMSI issue (see IMSI Number). There is very little that can be done if that's the case.

See transmission strength under Initial Activation.

Turning Airplane mode off and then on sometimes re-establishes connectivity but this is only a temporary "fix".

Dropped Calls and/or Call Quality

The main cause seems to be variable internet speed. The faster, and more stable your speeds are, the better the call, connectivity and quality-wise.

Latency, packet loss, etc will affect your calls. RTP jitter can also be a problem with VoIP calls using the MicroCell. RTP (Real Time Protocol) is defined as the variation in the delay of received packets and can be caused by network congestion, improper queuing, or configuration issues.

Another cause may be that the tower signal is stronger than the MicroCell signal (see Handing Over and Initial Activation above). Disabling call handout on your MicroCell Settings page (under your myAT&T account) may help. Apparently you can call Support and the agent will open a ticket to have the tower signal compared to the MicroCell signal. I don't know how useful this would be because I doubt if Support can properly interpret the numbers unless they are glaringly different, and there is nothing that can be done with tower signal strength.

Keep in mind that a stucco house can act as a Faraday cage and interfere with your calls. Terrain, weather, buildings, building construction, foliage, and **tower aim** can all play a role in increasing or decreasing tower signal strength.

Turning off LTE (on an iPhone 5 for example) may improve the signal if the phone sporadically detects LTE and tries to connect to it.

Leave WiFi on your phone turned on. That way, data is handled by your router's WiFi and voice is left to the MicroCell.

Vonage

If you have the Vonage VoIP service you may encounter MicroCell problems with the use of the Vonage v-Adapter.

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Vonage uses the SIP ALG protocols (Session Initiating Protocol Application Layer Gateway) which is used to try and avoid configuring static NAT on a router. Many routers today come with this feature enabled by default. While ALG could help in solving NAT related problems, the fact is that many router's ALG implementations are wrong and break SIP.

SIP ALG will not cause problems with the MicroCell as the MicroCell does not use SIP protocols. However, in many cases, the SIP ALG is implemented poorly and can cause other issues. If you can make your MicroCell work with SIP ALG turned off, then it's an indication that SIP ALG is implemented poorly causing MicroCell traffic disruption even though, in theory it should not.

MISCELLANEOUS

Sometimes the MicroCell just doesn't work because of the multitude of variables. It is also possible that the MicroCell is a lemon and needs to be replaced. If that's the case, then you will have to contact Support and go thru a series of troubleshooting steps before they can determine that it needs to be replaced. All of those steps have been detailed above so you'll be repeating what you've already done, but Support has to document that THEY went thru those steps with you.

Be polite, and patient with Support. They are limited in what they can do and I think their support is limited at times as well. Be as clear and concise as possible in describing your problem, what you have done to fix it, and explain your setup as clearly as you can. Sending a PM to ATTMobilityCare, with your detailed issues, account information, what you have done to correct the issue, any trouble ticket numbers issued, the best way for support to contact you, and your location is sometimes more efficient than phone Support.

For a brief period of time, the MicroCell was given away for free. This was more for marketing purposes than anything else but some folks who had documented coverage issues got them free as well. That program is over now but you may be able to get a replacement (if it is out of the Warranty Replacement period) for a reduced cost. That is totally up to the support person you talk to so be nice. Some corporate store managers have even been known to go above and beyond and replace them for free (or reduced cost) but that is totally up to the manager and certainly not company policy. However, there are still customers who receive free MicroCell's from time to time so it can't hurt to ask. If you receive a replacement MicroCell that doesn't come with the ac adapter, ethernet,cable, or complete documentation then it is a refurbished unit.

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Purchasing a used MicroCell

1. Caveat emptor (let the buyer beware) is the operative word.
2. Do not buy any used MicroCell that the seller will not, or cannot **guarantee** was properly deactivated. AT&T is very reluctant to de-register a MicroCell because they don't know if it has been stolen or not.
3. Do not buy any MicroCell that is not in good working condition (does not rattle for example if shaken gently). The seller should provide you with a small return window (14 days for example).
4. Even if the MicroCell is sold as "new" or within its one year warranty, the warranty is not transferrable.
5. Ask the seller to send you or post a picture (close up) of the bottom of the unit showing the serial number. The serial number is how the MicroCell is registered to your account so if you enter the serial number on the myAT&T page that should tell you if the number is bad or still registered under another account (courtesy of rjniles).

Testing Signal Strength

Testing the signal strength of the MicroCell can be a useful tool for determining if poor or loss of signal is the cause for dropped connections.

On iPhones (probably 4 and higher) there is a hidden mode called Field Test. It is not a hack so entering it will not damage the phone in any way. Press Phone and dial *3001#12345#* and then Call. In the upper left you should see something like -71. That is the dBm reading which is the signal strength in Watts. 0 dBm = 1mW. The negative values represent small but positive numbers on a logarithmic scale. So the closer to 0 the stronger the signal is. For example, a reading of -71 dBm is a stronger signal than a reading of -80 dBm. The range is -30 dBm to -130 dBm. The MicroCell is a 3G device so the dBm reading is related to RSSI (Received Signal Strength Indicator). LTE is a bit more complicated because the signal is related to RSRP (Reference Signal Received Power) so a conversion to ASU (Arbitrary or Absolute Signal Unit) may be necessary. That conversion results in a positive number. To exit Field Test just press the Home button. The Field Test does not do real time sampling so if you want to check the signal strength from different areas in your home you will have to Exit the Field Test and the enter it again. There is a way to toggle back and forth between Field Test and the regular signal bars but that is beyond this discussion.

For Android-based phones there is a signal strength mode that can be accessed by going to Setting -> About Phone -> Status. You should see the strength listed in dBm and ASU. The range for dBm is about -60 dBm to -112 dBm. As of this writing there is a reported error in the Android OS that affects the accuracy of the dBm reading and the ASU calculation. The results should still be valid enough

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though to give you an idea of signal strength.

There are other apps and hacks that can be downloaded for either OS that do the same thing, and more.

Android OS

If you recently updated your phone and problems appeared shortly after the update it's more than likely due to the update and not necessarily the MicroCell. According to some Android programmers I've talked to, "we have Google/Android to thank for allowing manufacturers to come up with an incredible number of screen sizes, resolutions, and differences in features in Android phones—otherwise known as device fragmentation. It makes testing and optimizing a significantly longer process when you're trying to reach as many people as possible for a single app or mobile site." Device fragmentation is not necessarily a bad term, but it is accurate.

From what I've been told, a "pure" Android OS is very stable and robust. The problems arise from the OEM's and mobility carriers and all the extra baggage they add to make their devices and services specific. Android is basically open source so pretty much anything can be added to it. The problem I see is inadequate testing by the OEM's and carriers to make sure that their extra "baggage" is compatible with whatever update has been pushed.

The Apple iOS, on the other hand, is still pretty much a closed system and Apple is very strict about what can be added "on top" of their OS. **This is not to say that iOS hasn't had its issues and by no means is that to be interpreted that it's a superior OS.** Both have their pros and cons.

The only way to resolve these compatibility issues is to pressure Samsung and AT&T to address and fix the issues. Easier said than done but calling Support because it's a "MicroCell problem" is rarely going to work because it's probably not the MicroCell itself but some app or feature layered on that is causing the issue.

My suggestion would be to disable all AT&T apps that you have on your phone , disable HD Voice, or try another messaging app like Textra if your problem is with MMS/SMS.

iPhone 6 Activation and Registration to the MicroCell

It used to be that purchasing a new phone was no big deal for the MicroCell as long as you kept the same phone number that the MicroCell was registered with. However, that has changed dramatically with the newer phones especially the Samsung and Apple phones. The iPhone 6S, for example, has now added GSM and CDMA frequencies.

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Unfortunately, neither the manufacturers and AT&T adequately test the new releases with the MicroCell because quite frankly, the numbers of MicroCell users is so small compared to their overall users base that it's just not that important to spend time and money on pre-testing.

The release of the iPhone 6S is a case in point. The steps outlined below have worked for most iPhone 6S users and there isn't any reason they won't work for Samsung phones, and others as well. These are covered elsewhere in the Tech Guide but I thought I'd summarize them here as well so as to make it easier to find and try should problems arise.

1. Log into your myAT&T account and go to your MicroCell settings.
2. Disconnect your MicroCell device. You may or may not have to delete phone numbers so try it first without deleting phone numbers.
3. Turn off the power to the MicroCell, wait a couple of minutes and then restore power.
4. Continue to setup the MicroCell and reactivate your account as if it were brand new. You may have to use uppercase letters when entering your address.
5. Once activation is complete, turn off and then on again your phone. You may have to do that twice.

Disconnecting the MicroCell and starting over from scratch forces the MicroCell to go thru the entire activation process as if it were new. This includes downloading any updates that are available but may not have been pushed to your MicroCell Service Area yet. Turning off and then on again your phone after successful activation registers the MicroCell to the phone's cellular neighborhood.

If you have issues with your MicroCell, whether it is brand new or a working MicroCell recently developing problems, don't always assume it's AT&T or the MicroCell. As service providers merge, expand their service areas, install new hardware or security protocols that may, and will, affect the MicroCell for the reasons given above (see VoIP Basics). There is very little, if anything at all, that AT&T can do if your ISP has made changes to their network. We have been fairly successful in bringing issues to the attention of some of the providers who have worked to correct the issues generated on their end but that can take time. Always bring your issues to the forum first because we can help in a lot of instances to restore service but if it is determined to be your provider, then you need to bring that to their attention as well.

With the demise of net neutrality as it was originally envisioned, some service providers have been limiting, and in some cases eliminating altogether, competing services if your ISP offers the same type of service. In other words, if you have AT&T

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cellular, but your ISP is Verizon, Verizon may prevent the MicroCell from using its internet to gain access to AT&T's servers.

Common Error Codes

FTC5284 - the system is probably stuck trying to process an earlier request and won't proceed until the error is corrected.

FTC223 – the customer has acquired GPS lock, but location check failure (Tolerance Failure) has occurred because the physical street address entered during online registration does not match the GPS information provided by the MicroCell. The MicroCell address does not match the current device location.

You should contact MobilityCare if you get either of those error codes, or a different one, and notify them of the error code.

MicroCell Alternatives

There are instances when the MicroCell just won't work in your environment as stated above. In that case, you may need to use a cellphone signal booster if WiFi-C is not an option. The two most common ones are as follows:

Cel-Fi (www.cel-fi.com). Cel-Fi makes one AT&T product, the Cel-Fi Pro. It costs around \$695 and provides 3G, 4G, and 4G LTE bandwidth coverage. There is a Cel-Fi Pro X product that is used with the Cel-Fi Pro for an additional \$389. It allows the two Cel-Fi Pro modules to be separated further apart and connected with an LMR cable. The Cel-Fi Pro is supposed to cover up to 13,000 square feet under ideal conditions.

Wilson Electronics (www.wilsoselectronics.com). These are not as expensive as Cel-Fi and have a number of models to choose from. They do take a little more time and effort to setup. The current name for their signal booster business is Weboost.

SUMMARY of TROUBLESHOOTING STEPS

Perform a Complete Reset/Activation

Power cycle the MicroCell

Power cycle the router/modem

Deactivate/reactivate your account

Turn your phone off and then back on to re-establish connectivity

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Hard reset the MicroCell

Check cables for condition and snugness of fit

Check orientation of the MicroCell

Use an external GPS antenna if necessary (only available on the older, white models)

Reset network settings on your phone or have support check your network settings

Enable WiFi, disable LTE on your phone

Disable Handout for your MicroCell via the settings page

Toggle Airplane mode on and off (lame)

Check stability of your internet speeds and make sure you have sufficient speed

Check that all of the necessary ports are open all the way to the AT&T servers

Port forward the ports to a static assigned IP address based on the MAC address of the MicroCell, or place the MicroCell in the DMZ like you would a gaming device

Try different locations in your house to find the “sweet spot”

Keep the number of devices between the MicroCell and AT&T to an absolute minimum

Adequate ventilation around the MicroCell

Check the ac adapter with a voltmeter. It should read 16VDC \pm 0.5 with no load

Connect the MicroCell directly to your modem to rule out any router issues

If you are using PowerLine Adapters, bypass them if possible and see if that improves your connection

For Quick Tips, see my Quick Tips blog: <https://forums.att.com/t5/Community-Blog/Help-My-MicroCell-Doesn-t-Work/ba-p/5125538>

DISCLAIMER

This has been a very long project and is still a work in progress. I have tried to make this as accurate as possible. As more accurate information, corrections, or fixes

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become available, I will update the document. You can PM me for any corrections or future additions to this “living” document.

I am not an AT&T employee. However, this document would not have been possible without the considerable help and guidance from the AT&T Admins, AT&T Support, and the MicroCell Forum members. **I would also like to extend a special thanks to Avedis53 for his help and support.**

Otto Pylot
August 2013

ADDITIONS/CHANGES

Version 2.1, July 2017

1. Clarified the use of port 45631 when a double NAT is present
2. Updated information on WiFi-C (WiFi Calling)
3. Updated contacting ATTCustomerCare to ATTMobilityCare
4. Expanded the comment about getting a replacement MicroCell under the Miscellaneous section
5. Added a comment about ADT Home Security Systems
6. Added an example of setting up WiFi-C on an iPhone 5SE under the WiFi Calling section
7. Added a comment about the use of WiFi Assist on iPhones under the WiFi Calling section
8. Added a comment about the GoPhone (pre paid account)
9. Various cosmetic and formatting changes
10. Added the link to my Quick Tips blog

Version 2.0, May 2016

1. Version 1.9 update was skipped and combined with v.2.0
2. Added a more detailed explanation of the GPS light
3. Updated the interpretation of the flashing green or red 3G light
4. Removed outdated Nokia information and added the Android OS comment
5. Added WiFi Calling and the MicroCell
6. Added Comment about activating an iPhone 6

Version 1.8, August 2015

1. Expanded VoIP testing and interpretation (under VoIP Basics)
2. Added a more current VoIP testing site and removed the original one
3. Added a workaround for a Double NAT (under Requirements)
4. Expanded a bit on the router port settings
5. Added ac adapter testing (under Technical Information)
6. Added comment on activating phones put on the Approved Users list

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7. Expanded a bit on contacting CustomerCare
8. Added comments about purchasing a used MicroCell (under Miscellaneous)
9. Added comment about using switches (under Connection Issues)
10. Added procedures to detect Signal Strength for iOS and Android phones (under Miscellaneous)

Version 1.7, October 2014

1. Added the new DPH-154 graphic
2. Briefly discussed the DPH-154 in the introduction
3. Listed the power adapter specs for the DPH-154
4. Listed common error codes (under Miscellaneous)
5. Listed MicroCell alternatives (under Miscellaneous)

Version 1.6, June 2014

1. Added the voip and speed test links (under VoIP basics)
2. Added the comment about multiple MicroCells at one location (under Requirements)
3. Change the wording of priority setup to alternate setup
4. Added page numbers to the Title of Contents page

Version 1.5, March 2014

1. Added a TOC with the MicroCell graphic
2. Added Wireless Home Phone as it relates to the MicroCell
3. Slight changes to the U-verse section
4. Added Vonage section
5. Added a comment about wireless broadband
6. Added a comment to the Miscellaneous section about competing services

Version 1.4, February 2014

1. MicroCell data speeds
2. U-verse Basics
3. VoIP Basics
4. Added a final comment to the Miscellaneous Musings section
5. Added a separate Ethernet conditions section

Version 1.3, October 2013

1. OpenBSD 4.9 settings
2. Using an alternate browser for Activation
3. Galaxy Note 3
4. Contacting ATTCustomerCare
5. Complete Reset/Activation procedure
6. MicroCell Service Area Outages

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Version 1.2, August 2013

1. First release