

TUNERS AND TV SETS FOR OVER-THE-AIR ATSC TELEVISION

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An International
Association of Technology
& Computer User Groups

Web location for this
presentation:

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SUMMARY

You can install a low-cost ATSC 3.0 tuner to either add the newfangled ATSC 3.0 signals to an existing television or to use a computer monitor connected to the tuner as a low-cost over-the-air television receiver.

TOPICS

- Three types of over-the-air TV channels in the U.S.A. and Canada:
ATSC 1.0 TV channels,
unencrypted ATSC 3.0 TV channels,
and
encrypted ATSC 3.0 TV channels
- Obtaining and installing an ATSC 3.0-capable tuner or TV set

"ATSC"

- **"ATSC"** stands for "Advanced Television Systems Committee" and it is sometimes called "digital television"

"ATSC" (continued)

- In the U.S. there are **three types of "ATSC" signals** for receiving television channels "over-the-air" for free:

Type 1: "ATSC 1.0" TV channels,

Type 2: "unencrypted ATSC 3.0"
TV channels,
















Type 3: "encrypted ATSC 3.0" TV channels (= "with DRM" = "with Digital Rights Management)
















"ATSC" (continued)

- All of the "Type 2" unencrypted ATSC 3.0 channels and the "Type 3" encrypted ATSC 3.0 channels in the San Francisco area example as shown at <https://www.rabbitears.info/market.php> and <https://www.rabbitears.info/market.php?request=atsc3>

"ATSC" (continued)

- The pink shaded channels with the yellow padlock icon are **Type 3 encrypted ATSC 1** channels:

| <u>Display Channel</u> | <u>Physical Channel</u> | <u>Video</u> | <u>Audio</u> | <u>Call Sign</u> | <u>Network/Programming</u> | <u>Nickname</u> |
|--|--|--------------|--------------|------------------|---|------------------|
| 02-1  | 7.1377 | 720p | DD5.1 | KTVU-HD | FOX  | "KTVU Fox 2" |
| 04-1  | 7.1376 | 1080p | DD5.1 | KRON-TV | CW  | "KRON 4" |
| 05-1  | 7.1379  | 1080p | DD5.1 | KPIX-TV | CBS  | "CBS 5 Bay Area" |
| 07-1  | 7.1380 | 720p | DD5.1 | KGO-HD | ABC  | "ABC 7" |
| 11-1  | 7.1378  | 1080p | DD5.1 | KNTV HD | NBC  (HDR) | "NBC Bay Area" |
| 14-1  | 7.1381  | 720p | DD5.1 | KDTV-TV | Univision  | "Univision 14" |

| <u>Display Channel</u> | <u>Physical Channel</u> | <u>Video</u> | <u>Audio</u> | <u>Call Sign</u> | <u>Network/P</u> |
|--|---|--------------|--------------|------------------|---|
| 02-1  | 7.1377 | 720p | DD5.1 | KTVU-HD | FOX  |
| 04-1  | 7.1376 | 1080p | DD5.1 | KRON-TV | CW  |
| 05-1  | 7.1379  | 1080p | DD5.1 | KPIX-TV | CBS  |
| 07-1  | 7.1380 | 720p | DD5.1 | KGO-HD | ABC  |
| 11-1  | 7.1378  | 1080p | DD5.1 | KNTV HD | NBC  |
| 14-1  | 7.1381  | 720p | DD5.1 | KDTV-TV | Univision  |

"ATSC" (continued)

- At the Mount Sutro tower site in the middle of San Francisco:
Only KRON-TV is transmitting an ATSC 3.0 signal.
3 out of 6 of a KRON-TV's channels stations are in the "**Type 3 Encrypted ATSC 3.0**" format
The remaining 3 are in the "**Type 2 Unencrypted ATSC 3.0**" format.

"ATSC" (continued)

- KRON-TV's channels have 1080p video resolution and DD5.1 audio format and these are the highest video and audio resolutions that are offered for over-the-air television in the San Francisco area.

"ATSC" (continued)

- https://en.wikipedia.org/wiki/5.1_surround_sound

"ATSC" (continued)

- All of the other TV channels emanating from Mount Sutro are in the "Type 1 ATSC 1.0" format and they are shown at <https://www.rabbitears.info/market.php> **without** a green arrowhead

"ATSC" (continued)

- **Type 1 "ATSC 1.0"** channels have been available since 2009
- **Type 2 "unencrypted ATSC 3.0"** TV channels have been available since 2021
- **Type 3 "encrypted ATSC 3.0"** TV channels have been available since 2023

"ATSC" (continued)

- "ATSC 3.0" is also called "NEXTGEN TV"
- The "NEXTGEN TV" logo is a registered trademark of the "Consumer Technology Association"
- The "Consumer Technology Association" is the sponsor of the "Consumer Electronics Show"



"ATSC" (continued)

- "ATSC 3.0" is also called "NEXTGEN TV"
- The "NEXTGEN TV" logo is a registered trademark of the "Consumer Technology Association"
- The "Consumer Technology Association" is the sponsor of the "Consumer Electronics Show"

"ATSC" (continued)

- The "NEXTGEN TV" logo will be used widely for television ads, documentation, and specifications. When used for a specific model of TV tuner or TV set, the "NEXTGEN TV" logo implies that the tuner or TV set is at least capable of receiving the first two types of "ATSC" television signals.

"ATSC" (continued)

- A "NEXTGEN TV" certification is the buyer's assurance that the tuner or TV set is able to receive
Type 1 "ATSC 1.0" television channels
and
Type 2 "unencrypted ATSC 3.0" television channels.

"ATSC" (continued)

- A "NEXTGEN TV" certification has **no bearing or indication** on whether a specific television tuner or receiver is capable of receiving Type 3 "encrypted ATSC 3.0" TV channels

Buyer beware ! A television tuner or receiver will be eventually useless as ATSC 3.0 channels convert from unencrypted to encrypted channels !

"ATSC" (continued)

- **"A3SA" stands for**
"ATSC 3.0 Security Authority"
- The A3SA's Web site is located at <https://a3sa.com>
- The A3SA's logo will rarely be used for television ads, documentation, or specifications. Instead, the term **"encrypted ATSC 3.0"** or **"encrypted NextGen"** will usually be used.



"ATSC" (continued)

- "A3SA" provides certifications for TV tuners and TV sets
- AN "A3SA" certification means that a tuner or a TV set is able to receive Type 3 "encrypted ATSC 3.0" television channels.

"ATSC" (continued)

- The **A3SA certification process** and the **"Nextgen TV" certification process** are independent and unrelated to each other.
- The "A3SA" certification program has massively slowed down the development and "uptake" of "ATSC 3.0" television channels, both from TV transmitter end and at the end-user TV tuner & receiver end.

"ATSC" (continued)

- The television industry has been insistent on developing and implementing Type 3 encrypted ATSC 3.0 channels to prevent illegal piracy and malware injection into over-the-air TV channels as explained at <https://cordcuttersnews.com/the-team-behind-nextgen-atsc-3-0-ota-tv-explains-why-drm-is-needed-for-free-ota-tv/>

"ATSC" (continued)

- The "A3SA" uses "Eonti" for digital certificates and Google subsidiary "Widevine" DRM (= "digital rights management") for encryption/decryption technology.

"ATSC" (continued)

- A3SA provides two versions of certifications:
- **A3SA certification version 1:**
A3SA certification for a tuner or TV set that can only receive "Encrypted ATSC 3.0" (Type 3) channels when the tuner or TV is connected (wired or wirelessly) to an Internet provider

"ATSC" (continued)

- **A3SA certification version 2:**

A3SA certification for a tuner or TV set that can only receive

Type 3 Encrypted ATSC 3.0"

channels even when the tuner or TV set is not connected (wired or wirelessly) to an Internet provider.

This higher version of A3SA certification is handy for tuners or TV sets that will not always be connect to an Internet provider (camping, etc).

"ATSC" (continued)

- Any tuner or TV set that can receive Type 3 **"encrypted ATSC 3.0" television channels** will eventually need to have an Internet connection in order to get firmware upgrades or to perform channel rescans from the Internet or to receive any **"encrypted ATSC 1" channel** for the first time after a channel scan so the **A3SA certification version 2's** offline capability is only for the convenience of the enduser of TV tuners and TV sets, when their TV tuners and sets do not have an Internet connection.

"ATSC" (continued)

- Some of sellers and manufacturers have incorrectly stated that their tuners or television sets that have **"A3SA certification version 2"** never need to be connected to the Internet.

"ATSC" (continued)

- A TV tuner or a TV set that can receive the first two types of ATSC.. signals will have a **"NextGen TV certification"**
- A TV tuner or a TV set that can receive all three types of ATSC.. signals will have **both** a **"NextGen TV" certification AND an "A3SA certification"**

"ATSC" (continued)

- At the present time (April 2024), 90+ percent of the over-the-air TV tuners (and TV sets) that are available at retail are obsolete since most of them only can receive **Type 1 ATSC 1.0" television channels** (and apparently do not have NextGen and A3SA certifications.)

"ATSC" (continued)

- At the present time (April 2024): some of the manufacturers of TV tuners (and TV sets) only have ATSC 1.0 tuners, while some of the manufacturers of TV tuners (and TV sets) have tuners that can only receive the first two types of ATSC channels

"ATSC" (continued)

- At the present time (April 2024): a few of the manufacturers of TV tuners (and TV sets) have tuners that can receive all three types of ATSC channels.

"ATSC" (continued)

- Between now (April 2024) and July 17, 2027, most of the existing **Type 1 ATSC 1.0 television stations** and most of the **Type 2 unencrypted ATSC television stations** will probably upgrade to **Type 3 encrypted ATSC 3.0 channels** so it is best to only purchase tuners and TV sets that can receive all three types of ATSC signals, to avoid rapid obsolescence.

"ATSC" (continued)

- ATSC uses
8VSB
(8-level vestigial sideband modulation)
In some software apps and some TV tuners, "8VSB" is used as a configuration selection instead of "ATSC" so be sure to select "8VSB", if you are given a choice when configuring a TV set, a TV tuner, or a TV software app.

"ATSC" (continued)

- Dash nomenclature in FCC assigned call signs
 - TV means "television station"
 - LP means "low power station"
 - CA means "Class A low power"
 - DT means "digital television"
 - HD means "high definition"
 - SD means "standard definition"
 - NX or -NG means "ATSC 3.0"

"ATSC" (continued)

- However, a television station that is transmitting an **Type 2 unencrypted ATSC 3.0 channel** or an **Type 2 encrypted ATSC 3.0 channel** is not required to use the -NX or -NG in their call sign: Some do and some do not.

ADTH

Good Day L.A. at 10am

10:00 am - 11:00 am

The morning news team offers an in-depth look at the latest headlines, traffic, weather & entertainment, also interviews with celebrities and public officials.


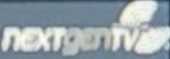
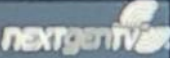
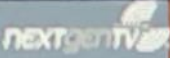
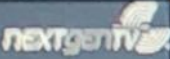


10:46 AM Feb 13 Tuesday

Now Playing 2-1 KCBS NX : The Price Is Right

| TODAY, 13 | | 10:00 am | 10:30 am |
|-----------|--------------|------------------------------------|----------|
| | 2-1 KCBS NX | The Price Is Right (TV-G) | |
| | 4-1 KNBC NX | Today with Hoda & Jenna | |
| | 11-1 KTTV NX | Good Day L.A. at 10am | |
| | 13-1 KCOP NX | Judge Mathis (TV-PG) | |
| | 2-1 KCBS-HD | The Price Is Right | |

Report Bookmark Signal Information Edit channels

| TODAY, 13 | | 10:00 am |
|---|---|------------------------------------|
|  2-1 KCBS NX |  | The Price Is Right (TV-G) |
| 4-1 KNBC NX |  | Today with Hoda & Jenna |
| 11-1 KTTV NX |  | Good Day L.A. at 10am |
| 13-1 KCOP NX |  | Judge Mathis (TV-PG) |
| 2-1 KCBS-HD | | The Price Is Right |

"ATSC" (continued)

- Every channel that is transmitted over-the air by a television station has a "Radio Frequency Channel" and a "Virtual Channel"

"ATSC" (continued)

- "Radio Frequency Channels" are sometimes called the "Physical Channels".
- "Virtual Channels" are sometimes called "Displayed Channels" since they are the channel numbers that your television set or tuner shows to you.

"ATSC" (continued)

- **"PSIP"** means

**"Program and System
Information Protocol"**

This information consists of a set of tables that is constantly transmitted by every ATSC television transmitter for each RF sub-channel.

ATSC (continued)

- The "PSIP virtual channel" and the "PSIP virtual subchannel" is displayed by set top boxes, TV sets, TV tuners, and TV software in one of four formats:
12.1, 12-1, 12-001, or 12001
- When television viewers say "channel", they usually mean the "PSIP virtual channel" or the "PSIP virtual subchannel"

MARKETING MISINFORMATION !!

- Please ignore the massive hyperbole by advertisers and sales personnel that "ATSC 3.0" (= "NextGen") TV provides **4K** video resolution. That capability is not available on any existing "ATSC 3.0" television channels at the present time (April 2024). It will probably be available in the next few years.

MARKETING MISINFORMATION !!

(continued)

- Please ignore all marketing claims that an existing tuner or TV set that can receive ATSC 1.0 "Type 1" signals can be upgraded in the future via firmware upgrades so that they can then receive unencrypted ATSC 2.0 "Type 2" signals and/or encrypted "Type 3" signals. It cannot happen!!

MARKETING MISINFORMATION !!

- Please ignore the massive hyperbole by advertisers and sales personnel that "ATSC 3.0" (= "NextGen") tuners and TVs provides **4K** video resolution. That capability is not available on any existing "ATSC 3.0" television channels at the present time (April 2024). It will probably be available in the next few years.

IMPLEMENTING OVER-THE-AIR TELEVISION AT YOUR HOME

- Step 1:
Internet-based site survey
- Step 2:
Procure antenna and tuner
- Step 3:
Install and configure equipment and software

STEP 1 DETAILS

INTERNET-BASED SITE SURVEY

- Start off by getting a "short list" of possible television channels at <http://antennaweb.org/Address> and/or <https://www.watchnextgentv.com/markets/> and/or <https://www.channelmaster.com/pages/tv-antenna-map>

STEP 1 DETAILS

INTERNET-BASED SITE SURVEY

(continued)

- To determine if the ATSC 3.0 channels at a specific location are encrypted, you can go to <https://www.rabbitears.info/market.php?request=atsc3>

STEP 1 DETAILS

INTERNET-BASED SITE SURVEY

(continued)

- This list at <https://www.atsc.org/nextgen-tv/deployments/> will give you an idea as to which cities are about to have Nextgen TV stations start broadcasting.

STEP 2 DETAILS

PROCURE TUNER AND ANTENNA

- The low-cost antenna that I use is available at https://hauppauge.com/pages/webstore2/webstore_antenna.html (but do not buy their TV tuners because (as of April 2024) their tuners cannot receive ATSC 3.0 channels yet)

STEP 2 DETAILS

PROCURE TUNER AND ANTENNA

(continued)

- To get an over-the-air tuner that can receive all three types of "ATSC.." channels, you can choose between the "ADTH NEXTGEN TV BOX" tuner, the "Zinwell ZAT-600B" tuner, or the "ZapperBox M1" tuner:

STEP 2 DETAILS

PROCURE TUNER AND ANTENNA

(continued)

- The "ADTH NEXTGEN TV BOX" tuner is about \$100 and requires an uninterrupted wired or wireless Internet connection for receiving **Type 3 encrypted ATSC 3.0** channels.

In other words, it has an **"A3SA Type 1"** certification.₅₅

STEP 2 DETAILS

PROCURE TUNER AND ANTENNA

(continued)

- The "Zinwell ZAT-600B" tuner is about \$150 and does not require a uninterrupted Internet connection for receiving **Type 3 encrypted ATSC 3.0** channels. However, it requires an Internet connection for scanning for channels and also for the very first use of a newly-scanned channel.

In other words, it has an "**A3SA Type 2**" certification.

STEP 2 DETAILS

PROCURE TUNER AND ANTENNA

(continued)

- The "ZapperBox M1" tuners are available in two models. They requires a wired or wireless Internet connection for receiving **Type 3 encrypted ATSC 3.0 channels.** In other ther words, they have an **"A3SA Type 1"** certification.
- Single tuner model = B0BNJS8PFS=\$224
- Dual Tuner model = B0BNJR924X = \$274

STEP 2 DETAILS

PROCURE TUNER AND ANTENNA

(continued)

- The "ADTH NEXTGEN TV BOX" tuner and the "ZapperBox M1" tuner both run the Google "Android" operating system according to Lon Seidman as explained by him at <https://www.youtube.com/watch?v=e1vTpSJHVyo>

STEP 2 DETAILS

PROCURE TUNER AND ANTENNA

(continued)

- The "ADTH NEXTGEN TV BOX" tuner runs Linux as explained at <https://adth.com/adth-and-tolka-awarded-first-certification-as-nextgen-tv-upgrade-accessory-receiver/>

STEP 2 DETAILS

PROCURE TUNER AND ANTENNA

(continued)

- The "ADTH NextGen TV Box" is available at the Walmart Web site at <https://www.walmart.com/ip/ADTH-NextGen-TV-Box-ATSC-3-0-NextGen-TV-Certified-Watch-Free-OTA-ATSC-3-0-1-0-in-4K-UHD-resolution/5297873740>

STEP 2 DETAILS

PROCURE TUNER AND ANTENNA

(continued)

- The Zinwell "ZAT600B" tuner is available at <https://www.channelmaster.com/products/nextgen-tv-receivers-zinwell-nextgen-tv-box>

STEP 2 DETAILS

PROCURE TUNER AND ANTENNA

(continued)

- The two Zapperbox M1 tuner models are available at <https://www.amazon.com/ZapperBox-Over-Tuner-Channel-Guide/dp/B0BNJR924X/>

STEP 2 DETAILS

PROCURE TUNER AND ANTENNA

(continued)

- A RG6 coaxial cable that has been terminated with the default threaded "F connectors" such as <https://www.amazon.com/Ultra-Clarity-Cables-Connectors-Connector/dp/B076VY8W8J>

STEP 2 DETAILS

PROCURE TUNER AND ANTENNA

(continued)

- An F-jack to F-jack adapter such as <https://www.amazon.com/VCE-Coaxial-Connector-Extension-Adapter/dp/B0107LH932/>

STEP 3 DETAILS

INSTALL TUNER AND ANTENNA

(continued)

- Install the antenna in a window
- Install an RG6 coaxial cable from the antenna to the tuner box

STEP 3 DETAILS

INSTALL TUNER AND ANTENNA

- Connect the tuner to a wired or wireless Internet connection (some lower-cost tuners will only be able to connect to a wireless Wi-Fi connection)
- Connect the tuner box's HDMI port to the HDMI port on a computer monitor or a TV set
- Power up the tuner and scan for TV channels.

TUNERS THAT CAN ACT AS GATEWAYS TO OTHER DEVICES

- To prevent having to install separate antennas for each over-the-air tuner or TV in your home, you can procure a tuner with "network" capability, = "network tuner capability", = "gateway" capability, = "streaming" capability, = "extend" capability:

"Tablo TV"

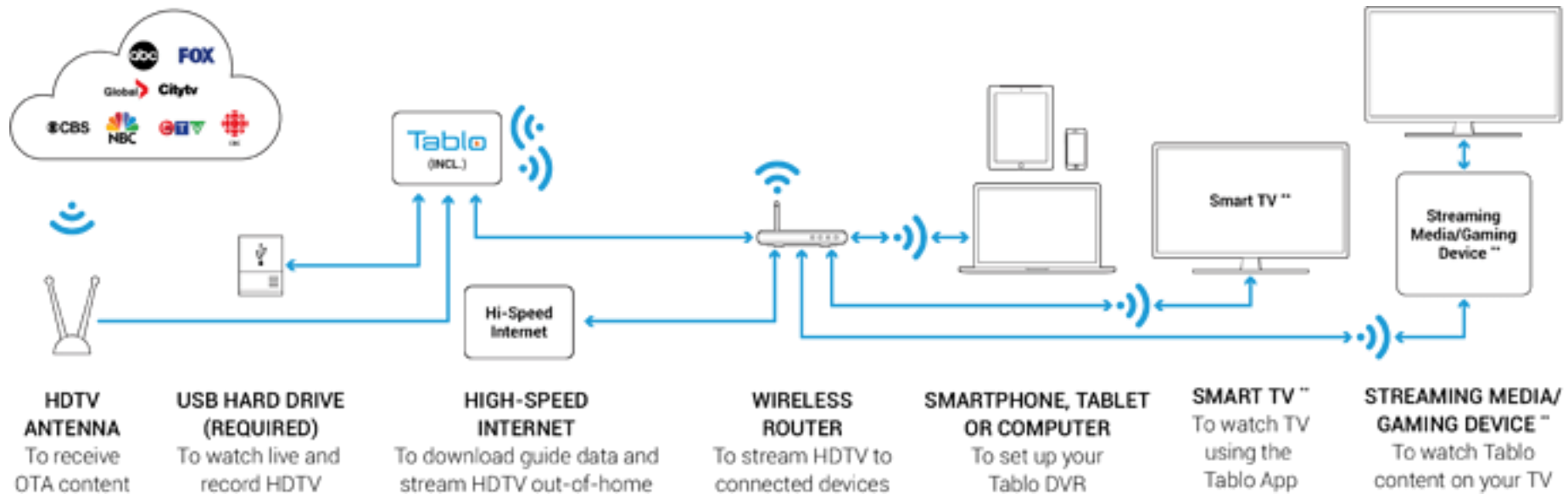
Hauppauge "WinTV with Extend"

SiliconDust's "HDHomeRun"

**BUT DO NOT BUY ANY OF THESE
(AS OF APRIL 2024) BECAUSE THEY
CANNOT RECEIVE THE TWO TYPES OF
ATSC 3.0 CHANNELS YET**

TUNERS THAT CAN ACT AS GATEWAYS TO OTHER DEVICES (continued)

- Tablo example is diagrammed at <https://community.tablotv.com/t/connecting-tablo-to-fire-or-roku/20195/5>



MANUFACTURERS OF ATSC 1.0 TV TUNERS THAT HAVE **PROMISED** TO PROVIDE ATSC 3.0 TUNERS IN THE FUTURE

- Tablo
- Hauppauge
- SiliconDust's HDHomeRun

BUT we recommend not buying them at the present time (April 2024) because none of these tuner brands can receive the two types of ATSC 3.0-enabled channels yet.

APPENDIX 1

- <https://www.resillion.com/services/device-testing/devices-testing/atsc-nextgen-tv/>
- rabbitears.info's legend is located at https://www.rabbitears.info/static.php?name=icon_guide
- Official list of NextGen certified devices: <https://www.watchnextgentv.com/shop/>

APPENDIX 2

- Prior to 2024, some of LG's higher-end smart televisions were capable of receiving **some** of the "ATSC 3.0" television channels.
- All of LG's 2024 smart televisions are unable to receive any of the "ATSC 3.0" television channels due to a patent dispute:

APPENDIX 2 (continued)

- <https://www.techradar.com/televisions/lg-drops-atsc-30-4k-tuners-from-its-2024-oled-tvs-and-samsung-or-sony-could-be-next>
- <https://www.flatpanelshd.com/news.php?subaction=showfull&id=1695713180>

APPENDIX 2 (continued)

- <https://blog.lon.tv/2023/09/26/new-lg-televisions-will-not-have-atsc-3-tuners-due-to-patent-dispute/>
- <https://www.digitaltrends.com/home-theater/2024-lg-tvs-no-atsc-3/>

APPENDIX 2 (continued)

- **LG's 2024 television sets can be retrofitted with add-on tuners that can receive Type 2 unencrypted ATSC 3.0 and Type 3 encrypted ATSC 3.0 channels !!**

