

Anchor 1.3 Reference static device for RTLS

Features

- Real-Time Location Based on UWB and TDoA Technique
- Decawave UWB Radio, 3-7GHz
- Manageable via web browser and RTLS Studio
- Ethernet backhaul
- Firmware upgrade via Ethernet





Anchor for RTLS TDoA

Ethernet Backhaul

Anchor is a reference device with a known position. Set of Anchors creates location infrastructure where Tags are being located.

The primary goal of the device is to gather radio signals from mobile locators called Tags and forward them to RTLS Studio where the position is being estimated. Moreover, Anchors can also receive data from sensors equipped within the Tag such as acceleration, orientation, button event or custom data payload. Data are further exposed to the user via open API.

Generally, the Anchor is an IP network device equipped with an Ethernet interface for both data backhaul and power supply. Anchors are configured and managed via RTLS Studio software. They are delivered with holders to simplify the installation in any premises. They are usually mounted above Tags which ensures maximum coverage and minimizes obstacles blocking its communication line.





DIMENSIONS	70x74x25 mm
WEIGHT	28g
POWER SUPPLY	USB or Passive PoE
POWER	1.3W
REQUIREMENTS	USB DC 5V, ≈ 250mA
	Passive PoE 48V, ≈ 30mA
TEMPERATURE	0 – 50 °C
RADIO RANGE	15-50m*
UWB ANTENNA	Omnidirectional
WARM-UP TIME	20 minutes
PLACEMENT	For Indoor Use Only
	Office, Warehouse, and Light industry environment.

*DEPENDS ON LINE OF SIGHT CONDITIONS, RADIO SETTINGS AND ENVIRONMENT



1 Power Supply

There are two options to power the Anchor. It can be powered either via USB or Passive PoE. Only one interface can be used at one time, never connect both.

Power Supply from USB – DC 5V, 500mA – mobile battery pack or USB Adapter with maximum cable length 1.8m.

Do not use longer USB cables, since cable voltage drop can cause instability of the device.

• **Power from Passive PoE Injector. DC voltage 24V/48V injected into the unused Ethernet pairs.** (Pairs 4,5 positive terminal, 7,8 negative terminal)



Always use galvanic isolated power adaptor with short circuit protection. Verified PN are: GS36E24-P1J, GS36E48-P1J Meanwell.

Please note that Passive PoE is not compliant with PoE IEEE 802.3af / Cisco. Anchor v1.3 cannot be powered from those PoE ports.

Single-port Injector

Contains DC Jack, PoE Port and Lan port.



Multi-port Injector for 19" rack

"Data LAN" ports are connected to the network Switch, "Power+Data" ports are connected to the Anchors. Never connect "Power+Data" ports to the computer or other network devices.



After connecting the Anchors to a power supply, let the Anchors warm up properly for at least 20 minutes. This period is required for correct Anchors' synchronization.

RTLS TDoA Anchor



2 Default IP Settings

Connect Anchor to PC via Ethernet. Anchor has implicit static IP configuration

- address 192.168.225.200
- mask 255.255.255.0

Set computer to the same address scope and point web browser to 192.168.225.200.

3 RF Profiles

There are several UWB RF Profiles available giving user optimal performance for desired application. RF profile selection is a tradeoff between energy consumption, range and channel utilization.

Profiles RF0 or RF3 are recommended for Anchors Sync.

Here is a brief RF Profiles comparison, ordered from best to worst:

Order	Signal Robustness and Range
Best	RF3
	RF0
	RF4
	RF1
	RF5
Worst	RF2

Table 1 RF Profiles Comparison

3.1 Sync and Blink Layer Separation

Good synchronization between the Master Anchor and neighboring Anchors must be achieved to get precise location performance. Synchronization is carried via SYNC UWB signal, the same medium is used also for the Blink signal from Tag. The Tag transmits randomly within given refresh rate.

If Sync and Blink are sent in the same time, collision can occur. Thus, Anchors synchronization can be interrupted for a while, which will have negative impact on position accuracy.

Normally this is not an issue, however once the number of tags is high or very frequent refresh rates are needed, one might need to separate radio communication between Sync and Blink layer. This can be done with either selection of non-interfering RF profiles or different channel per Sync and Blink.

3.2 Separation by RF Profiles

RF0, RF1, RF2 interfere between each other while, they do not interfere with RF profiles RF3, RF4, RF5.



RF profile	RF0	RF1	RF2	RF3	RF4	RF5
RF0	×	×	×	~	✓	~
RF1	×	×	×	✓	~	~
RF2	×	×	×	✓	✓	~
RF3	~	~	~	×	×	×
RF4	\checkmark	\checkmark	\checkmark	×	×	×
RF5	~	~	\checkmark	×	×	×
~			Without Int	erferences	3	
×	Interferences occurs					

Example: Sync layer set to RF0 and blink layer set to RF3 both on the same Channel 5. Communication will not interfere even if the transmissions occurs exactly at the same time.

3.3 Separation by Channels

Channels can also help with a communication separation between layers. Neighbor UWB channels can interfere between each other, because of very broad bandwidth. Therefore, one should skip adjacent channel if possible.

Example: Sync layer set to Channel 5 and Blink layer set to Channel 3 will not interfere.

4 UWB Channels

Channel	Center Frequency (MHz)	Band (MHz)	Bandwidth (MHz)
1	3494.4	3244.8 – 3744	499.2
2	3993.6	3774 – 4243.2	499.2
3	4492.8	4243.2 - 4742.4	499.2
4	3993.6	3328 – 4659.2	1331.2 (real approx. 900)
5	6489.6	6240 – 6739.2	499.2
7	6489.6	5980.3 – 6998.9	1081.6 (real approx. 900)

Table 2 UWB Radio Channels

5 Reset to Defaults

- 1) Power up the device
- 2) Press the RESET button and hold for 3s
- 3) Magenta LED indicator blinks once and the Anchor is in its default settings.

V1.4



Default configuration is *:

- Blink Channel: CH5 / RF Profile Blink: RF3
- Sync Channel: CH5 / RF Profile Sync: RF3

*Default configuration could be changed please read the news on <u>partner portal</u> regarding the default configuration.

6 Firmware Update

Firmware is uploaded to Anchor via Ethernet interface. Firmware upgrade is done over UDP messaging on L2 layer. Therefore, computer must be connected directly to anchor or on the same L2 segment (no router on the path).



Always make sure that the power supply is stable during the firmware update. You may need to disable all other interfaces in the Network and Sharing Center (Wi-Fi, Bluetooth etc.). Right-click on the interfaces and select "Disable". Please also disable Firewall in case of troubles.

- 1) Connect the Anchor directly into your computer by an Ethernet cable.
- 2) Download and install the LM Flash Programmer.
- 3) Go to Windows' Network and Sharing Center and change your Ethernet IP address like this:

Internet Protocol Version	4 (TCP/IPv4) Properties
General	
You can get IP settings assigned auton this capability. Otherwise, you need to for the appropriate IP settings. Obtain an IP address automatical	natically if your network supports ask your network administrator Y
IP address:	192 . 168 . 225 . 5
Subnet mask:	255 . 255 . 255 . 0
Default gateway:	
Obtain DNS server address autom	natically resses:
Preferred DNS server:	
Alternate DNS server:	
Validate settings upon exit	Advanced
	OK Cancel

- 4) Run the LM Flash Programmer as an Administrator
- 5) On the first page, select Manual Configuration, select the Ethernet Interface and type in the IP and MAC addresses of the Anchor that you wish to update:

V1.4



ψ.	LM Flash Prog	grammer - Build 1613 -	
Configuration Pro	gram Flash Utilities	Other Utilities	Help
Quick Set	uration - see below		•
, is it is i			
Interface		Client IP Address: 192.168.2	25.104
Ethernet	-	Client MAC Address: d8:80:39:	61:f9:e2
Ethe	rnet Adapter: 172.16	. 18. 131 - Intel(R) Ethernet Connection ((3) I218 💌

You can find the addresses from RTLS Manager, for example from the Anchors Summary tab.

Go to the "Program" tab and find the configuration file by clicking "Browse" and select path to a new anchor firmware file. Please double check Anchor's hardware revision to match to the firmware before further step.

The latest firmware can be obtained through Sewio Partner Portal.

49	LM Flash P	Program	nmer - Bui	id 1613	-		×
Configuration Pro	gram Flash Utilitie	es Other	Utilities				Help
Select .bin file							
am\Sedlacek\T	DOA Anchor bin\R	TLS TOO	A Anchor v1	021 beta1	.bin	Brows	e
,	'	-				_	_
Options							
Erase Method:							
C Erase Ent	ire Flash - (faster)						
Erase Neo	essary Pages - (slo	ower)					
🗌 🗌 Verify After F	rogram						
Reset MCU A	fter Program						
Program Ac	ldress Offset: 0x						
CRC32		_					
Source CRC:	2=		Device CRC3	2 =			
Calculate							
Program	1				Hardw	are Re	set
	_						
	_	-				_	_
	TEXAS	s Ir	NSTE	RUM	IEN	IT	S
			~11				-
dle					_		

6) Then click on "Program":



Infiguration Program Plash Utilities Other Utilities Hele elect.bin file	LM Flash	h Programmer - Build 1613 🛛 🗕 🗆 🚿
elect bin file sam/Sedlacek/TDOA_Anchor_bin/RTLS_TDOA_Anchor_v1_021_beta1.bin Browse ptors Erase Method: C Erase Roters Flash - (faster) F Erase Rotessary Pages - (slower) Verify After Program Rogram Address Offset: 0x RC32 Source CRC32 = Device CRC32 = Calculate Program Hardware Reset Frogram Hardware Reset Frogram	Configuration Program Flash Util	ilities Other Utilities Help
elect Jon file isam/Sedlacek/TDOA_Anchor_bin/RTLS_TDOA_Anchor_v1_021_beta1.bin Browse ptons Erase Method: C Erase Entire Flash - (faster) C Erase Nactive Program Program Address Offset: 0x RC32 Source CRC32 = Program Hardware Reset Very Attack S INSTRUMENTS		
samlSedlacek[TDDA_Anchor_binRTL5_TDDA_Anchor_v1_021_beta1.bin Browse ptons Erase Method: C Erase Entire Flash - (faster) C Erase Necesary Pages - (slower) Verfy After Program Program Address Offset: 0x RC32 Source CRC32 = Calculate Program Hardware Reset Vip TEXAS INSTRUMENTS	Select .bin file	
ptors Frase Method: C Erase Entire Flash - (faster) F Erase Mecessary Pages - (slower) Verify After Program Rogram Address Offset: 0x RC32 Source CRC32 = Calculate Program Hardware Reset Methods Hardware Reset Methods Hardware Reset Methods Hardware Reset Methods Hardware Reset Hardware Reset Hardware Reset	am\Sedlacek\TDOA_Anchor_bin	in\RTLS_TDOA_Anchor_v1_021_beta1.bin Browse
Erase Method: C Erase Entire Flash - (faster) F Erase Neticessary Pages - (slower) Verify After Program Reset MCU After Program Program Address Offset: 0x RC32 Source CRC32 = Calculate Program Hardware Reset TEXAS INSTRUMENTS	Options	
C Erase Entire Flash - (faster) C Erase Necessary Pages - (slower) Verfy After Program Program Address Offset: 0x C32 Source CRC32 = Calculate Program Hardware Reset V Calculate Calcula	Erase Method:	
	C Erase Entire Flash - (faste	er)
Verify After Program Program Address Offset: 0x RC32 Source CRC32 = Calculate Program Hardware Reset Verify TEXAS INSTRUMENTS	Erase Necessary Pages - ((slower)
	🔲 Verify After Program	
Program Address Offset: 0x RC32 Source CRC32 = Calculate Program Hardware Reset TEXAS INSTRUMENTS	🔽 Reset MCU After Program	
RC32 Source CRC32 = Device CRC32 = Hardware Reset	Program Address Offset: 0	0x
Calculate Program Hardware Reset TEXAS INSTRUMENTS	CRC32	
Calculate Program Hardware Reset TEXAS INSTRUMENTS	Source CRC32 =	Device CRC32 =
Program Hardware Reset	Calculate	
Program Hardware Reset		
🜵 Texas Instruments	Program	Hardware Reset
🔱 Texas Instruments		
🜵 Texas Instruments		
TEAAS INSTRUMENTS		AC INCTOLIMENTS
•		13 INSI KUMENIS
	•	

You should see the progress in the lower bar. If there is no progress at all, **make sure that all** interfaces besides Ethernet are disabled!

- 7) After the upload is finished it will be signalized by the "Done!" message.
- 8) You can check the new configuration in RTLS Manager on the Anchors Summary.

7 Orderable Device Information

Name	status
Anchor Router Cube 1.3	Discontinued