# Frame Alignment Offset

App Note

Frame Alignment Offset

Telecommunication networks require accurate and reliable synchronization to operate correctly. TDD radio frames require time and phase alignment between radio base stations to prevent interference and related loss of traffic.

Tarana G1 has timing compatibility with LTE devices that use TDD Config 2 Special Subframe 7 frame timing. This particular LTE configuration utilizes 10 downlink symbols, 2 guard period symbols, and 2 uplink symbols. Provided the respective devices are synced in start timing, they will theoretically not interfere with each other; adjacent devices will transmit simultaneously so that neither device will receive the other's transmissions.

In cases where synchronization is not exact, the frame alignment offset configuration option allows adjusting the start of the Tarana frame relative to the 1 pulse-per-second (PPS) from the GPS receiver. This setting is provided on CBRS devices only.

Note: The minimum software release for this feature is 0.997.029.00.
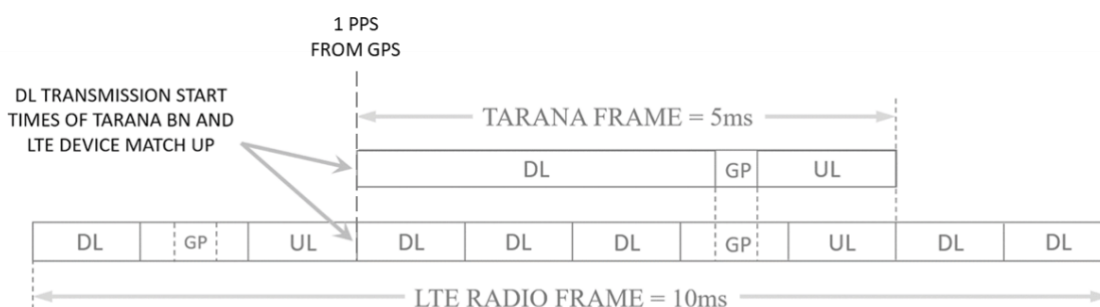
If the timing between the LTE devices and Tarana base nodes is out of sync, this can cause repeated near-field interference with each transmitted or received frame, depending on the offset of the timing. The graphic below shows how a Tarana frame that is offset too early can have a negative effect on other devices' uplink traffic flow.
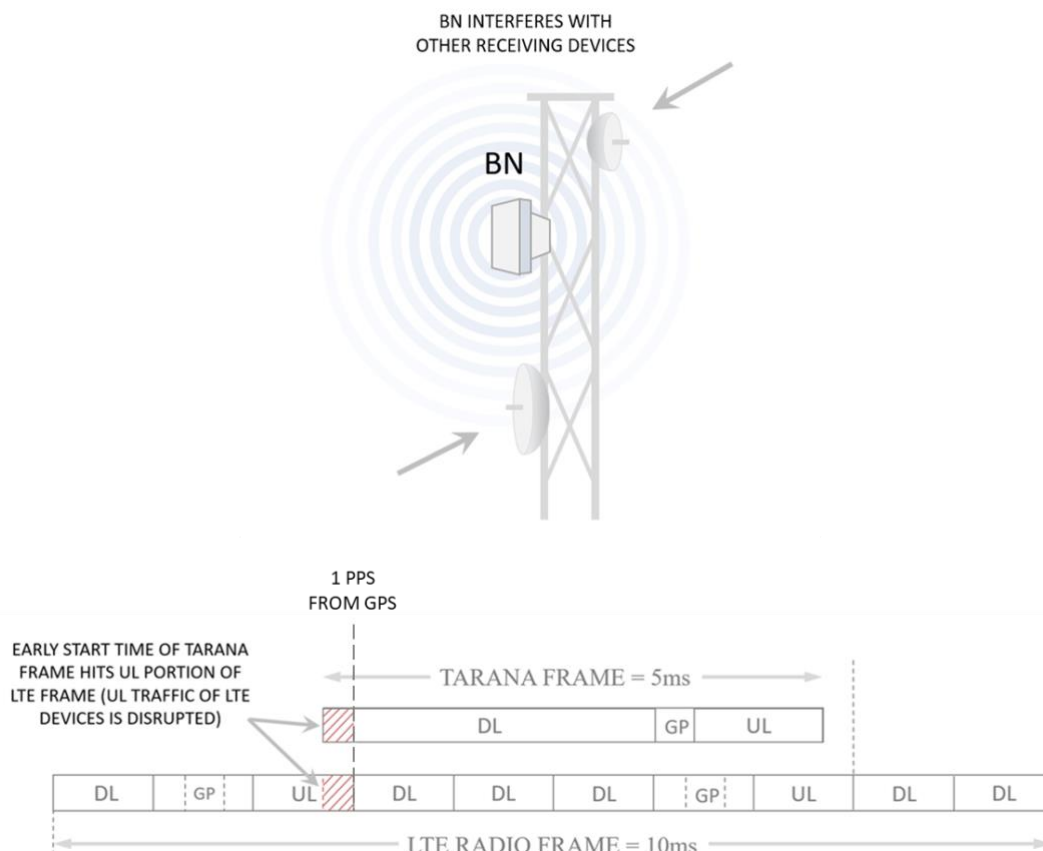
If the Tarana frame is offset too late, it can result in poorer uplink throughput on the Tarana base node. Appropriate fine-tuning of the frame alignment can alleviate such interference.
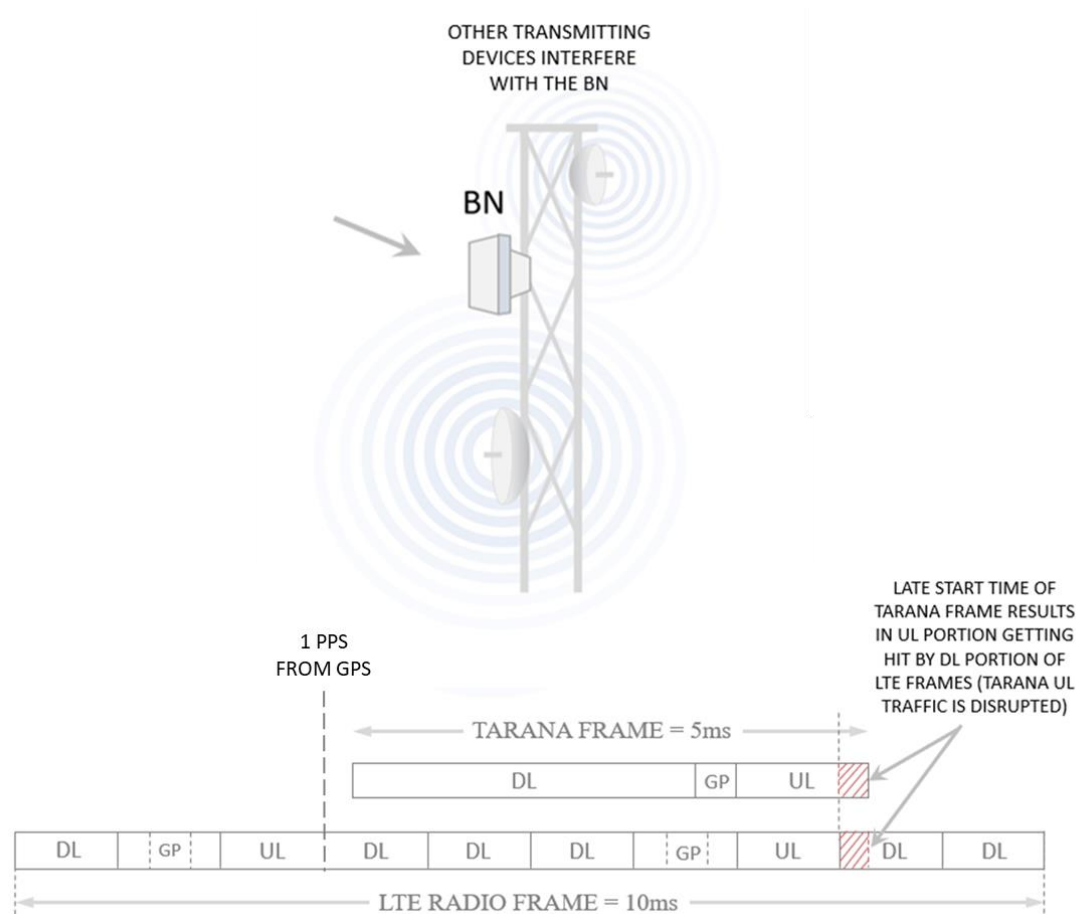
Any frame alignment offset implemented on a base node should be configured consistently across all other base nodes in range of this base node that share either of the same carrier frequencies. It is not possible to use the frame alignment offset to align with multiple frame configurations. The frame alignment offset only applies to the base node. The remote nodes automatically align to the base node's frame timing. An adjustment of the offset will disconnect any connected remote nodes. Remote nodes will reconnect and realign with the base node's timing automatically.
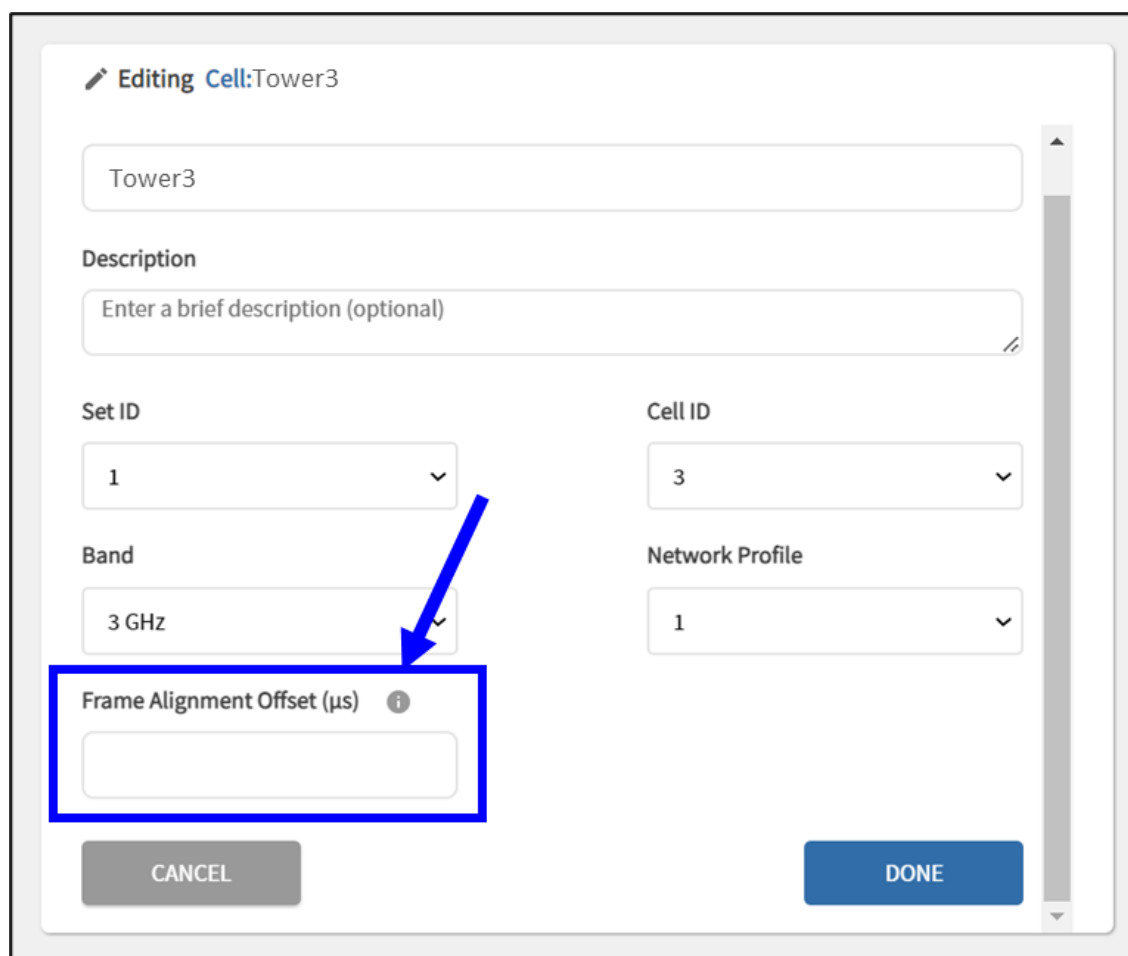
The table below shows the compatible Tarana network profiles with the supported LTE configuration.

Tarana Network Profiles	Supported LTE configuration
Network Profile 1	TDD Config 2 Special Subframe 7
Network Profile 2	TDD Config 2 Special Subframe 9
Network Profile 5	Unsupported
Network Profile 6	Unsupported

The frame alignment offset allows adjusting the start of the Tarana frame relative to the 1 PPS pulse from the GPS receiver. The value ranges from -187 µs (min) to 4821 µs (max). It is important to note that the base node will experience a radio reset when a change is made to the frame alignment offset, which will temporarily disconnect all connected remote nodes.

The performance effects of improper frame alignment can be quite drastic. This is typically detected by throughput in both directions of the link being a fraction of what it should be when the link KPIs appear to be mostly normal. Although tuning the frame-alignment setting can be a trial-and-error exercise, a setting that commonly remedies frame-alignment issues on CBRS links is 2775 µs.

To set the frame alignment offset, log into TCS with an account that has OP Admin privileges. Go to the Admin → Network Configuration section. Navigate to the Cell level and click Edit. Fill in the desired value, then click Done.

Please contact Tarana Support for recommendations on proper frame alignment offset values.

About Tarana

Tarana Wireless, Inc. is the performance leader in next-generation fixed wireless access network solutions, powered by a number of industry-first and well-proven breakthroughs in perfect, multidimensional optimization of radio signals. Its Gigabit 1 fixed access system overcomes previously insurmountable network economics challenges for service providers in both mainstream broadband and underserved markets, using free unlicensed spectrum. The company is headquartered in Milpitas, California, with additional research and development in Pune, India. For more information, visit taranawireless.com.