CLAIMS:

1. A satellite communications system for generating estimates of location and time from passively received non-GNSS communications signals not designed or intended or readily usable for location and time extraction by ground terminals, comprising:
    a. an electrically-steered multi-beam antenna configured to steer each beam of two or more beams of the multi-beam antenna to track and simultaneously passively receive a signal from each of two or more respective satellites;
    b. a receiver for each of the two or more beams of said multi-beam antenna to receive said respective signal;
    c. a processing device configured to determine a location of said system based on a combination of at least: each of the respective signals received by the two or more beams of said multi-beam antenna, and by said respective receivers; and ephemeris data for the respective satellites.
2. The system of claim 1, said processing device configured to estimate an angular position of each satellite based on a direction of arrival of the respective signal being the steering angle of the respective beam, said processing device further configured to triangulate the location of said system based on said estimated angular positions.
3. The system of claim 1, said processing device configured for extracting a current time from the signals.
4. The system of claim 3, further comprising an onboard atomic clock for supplementing and stabilizing the current time extracted from the signals.
5. The system of claim 3 or 4, wherein said processing device configured for determining time-of-flight and distance from each satellite based on the current time and received non-GNSS signals.
6. The system of claim 5, wherein the processing device is configured to use the distance from each satellite to determine the location of the system.
7. The system of claim 1, wherein the processing device is configured to use Doppler shift of signal channels of the signals to infer relative velocity and trajectory of each satellite relative to the system.
8. The system of any preceding claim, wherein angle of arrival, time of flight, and Doppler shift measurements are combined to improve position estimate accuracy.

9. The system of any preceding claim, wherein the processing device is configured to use multiple measurements of the same satellite over time to establish an estimate of the satellite trajectory to improve estimated location and accuracy.
10. The system of any preceding claim, wherein the processing device is configured to use a local IMU sensor to correlate signals received at different times to improve estimated location and accuracy.
11. The system of claim 1, wherein the processing device is configured to establish one or more bidirectional general-purpose communications links with the non-GNSS satellites to obtain orbital ephemeris data on all of the other non-GNSS satellites being tracked.
12. The system of claim 1, wherein the processing device is configured to receive a cooperative satellite broadcast by one or more of the target satellites to distribute orbital ephemeris data on all of the target satellites.
13. The system of claim 1, wherein the processing device is configured to use a terrestrial data connection to obtain orbital ephemeris data on all of the target satellites.
14. The system of claim 1, wherein ephemeris data for potential target satellites is preserved in local data storage for access.
15. The system of any preceding claim, wherein the processing device is configured to use an uncertainty of each independent measurement to estimate an overall position uncertainty.
16. The system of claim 1, wherein the antenna is a VSAT antenna.
17. The system of claim 16, wherein the antenna is a phased array antenna.
18. The system of claim 16, where the antenna is a lens antenna array.
19. The system of claim 1, wherein at least one of the satellites is in LEO.
20. The system of claim 1, wherein at least one of the satellites is in MEO.
21. The system of claim 1, wherein at least one of the satellites is in GEO.
22. The system of claim 1, wherein the satellites are in multiple orbits.
23. The system of claim 1, wherein the signals are Telemetry, Tracking and Control links transmitted at Ka band.
24. The system of claim 1, wherein the signals are Telemetry, Tracking and Control links transmitted at Ku band.