# 28-Day Extended Ephemeris

## Next Generation GNSS Satellite Orbit Prediction Technology

Before a GPS receiver can calculate a position, it must know the locations of a minimum of four satellites. A standard GPS receiver does this by downloading satellite broadcast information that describes their orbital trajectory (also known as an “ephemeris”). The problem with this approach is that broadcast ephemeris messages are transmitted at a very slow speed (50bps) and they are valid only for a short period of time (2-4 hours). In addition, under poor signal environments such as indoors, urban canyons, and dense tree covered areas, downloading broadcast ephemeris information can take minutes or, often, fail altogether.

Today, end-users expect instant connectivity; as such, they are not willing to wait upwards of 30-60 seconds for a GPS position fix. Using our 28-Day Extended Ephemeris service, GPS chipsets or OEM devices can expect a significantly reduced time to position fix of around 2 seconds[1].

Our patent pending 28-Day Extended Ephemeris service is based on ultra-high performance data compression techniques designed to minimize the ephemeris data file to 20 kbyte per week without any noticeable loss in accuracy. In addition, with our proprietary prediction algorithms, our orbit and clock prediction accuracy is at least 2 times better than the competition.

Along with our 28-Day Extended Ephemeris service, we also offer a lightweight software client written in platform independent C code. This software client was designed from the ground up to operate efficiently on low-power processors (e.g. ARM Cortex M0 and M3 etc.) with very low memory and storage requirements.

While a typical mobile phone may require 7 or 14 days of extended ephemeris, an unconnected device such as a digital camera would likely need 28 days. Likewise, depending on the intended application and network availability, M2M applications may require up to 28 days of prediction information. Our 28-Day Extended Ephemeris service is capable of providing different levels of prediction duration and compression accuracy, this feature enables a chipset or OEM device manufacturer to manage and optimize the network traffic based on their unique applications.

For customers that would like to incorporate our technologies into silicon, proprietary platforms, or operating systems, we can provide collaborative engineering support to assist in integration; please contact us for details.

## Features and Benefits

**28-Day Extended Ephemeris service** for reducing average receiver Time-To-First-Fix from upwards of 30-60 seconds to around 2 seconds[1]

With extended ephemeris data, GNSS receivers can **obtain position fixes without continuous tracking of satellites**

Ultra-high performance data compression techniques to **minimize data transfer requirements** (20 kbyte per week) without any noticeable loss in accuracy

**Unparalleled orbit and clock prediction accuracy** allow users to obtain accurate predictions with at least 2 times better than the competition

**Ultra-efficient client software** was designed from the ground up to operate on low-power processors

**Very low memory and storage footprint** opens up new opportunities for low-cost M2M applications for the internet of things

**Platform independent client software** allows for seamless support across different hardware and software platforms

**Variable prediction duration and compression accuracy** allow customers to manage and optimize network traffic for specific target applications

baseband TECHNOLOGIES

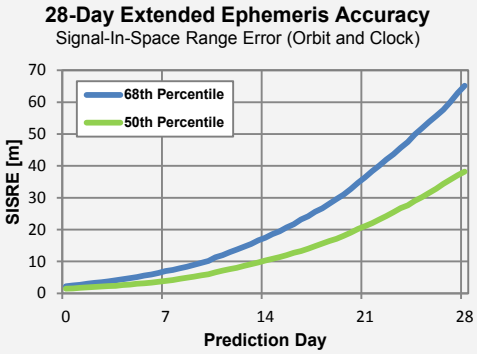
Preliminary

# Performance at a Glance

## System Performance[2]

Time-To-First-Fix (TTFF)[1]

| | | |
|---|---|---|
| | Warm | 1 - 2 seconds |
| | Cold | 1 - 6 seconds |
| Prediction Duration | 1, 7, 14, 21 or 28 Days | |
| Accuracy Performance 68th Percentile SISRE (Orbit and Clock) | Day 1 | 2.7 m |
| | Day 7 | 7.0 m |
| | Day 14 | 17 m |
| | Day 28 | 65 m |
| Extended Ephemeris Data Size | 20 kbyte per week | |
| GNSS Constellations | GPS<br>GLONASS (Q2-2013) | |




## Software Client Specifications[2]

| | |
|---|---|
| Execution Code Size | 9.5 kbyte |
| Run-Time Memory Usage | 3 kbyte |
| Run-Time (ARM Cortex M3) | < 0.9 seconds |
| Programming Language | C |
| Platform Support | Windows 7, Linux, Embedded ARM & others[3] |
| GNSS Chipset Support | SiRF, u-blox & others |

## Target Applications

- Mobile phones
- M2M devices and internet of things
- GNSS chipsets and modules
- Digital cameras
- Low-power tracking devices

**Notes:**

1. TTFF is chipset/receiver dependent
2. Specifications are subject to change
3. Please contact us for Windows Phone, Android, and other operating systems

For more information on the 28-Day Extended Ephemeris satellite orbit prediction technology, please visit www.basebandtech.com.

baseband TECHNOLOGIES

Preliminary

Baseband Technologies Inc.
Suite #120
3553 31 Street NW
Calgary, Alberta
CANADA T2L 2K7
Tel.: +1-403-668-0699
www.basebandtech.com