



Intel® 2012 Responsiveness Technologies

Consumers today expect their PCs to be instantly available with the latest information from the internet. Intel® Smart Response Technology, Intel® Rapid Start Technology, and Intel® Smart Connect Technology, in concert with the Intel® 7 Series Chipset make this expectation a reality.

What is Intel® Smart Response Technology?

We store a lot of diverse types of content on our PCs: Movies, photos, music, documents—the list goes on. Intel® Smart Response Technology¹ enables a lower-cost, small-capacity SSD to be used in conjunction with a low-cost, high-capacity hard disk drive to provide a high-performance, cost-effective storage solution. As a result, you can fast-track to your favorites—faster access to the files and applications you use the most.

Key benefits

- Faster system startup and shutdown
- Faster application performance and up to 2x faster game launch^{2,3}
- Best performance/GB storage solution
- Flexible and easy to use

How it works

Intel Smart Response Technology intelligently caches applications and data blocks to the SSD that will benefit most from acceleration. The cache policy also differentiates between high-value data (application, user, and boot data) and low-value data like that which may be caused by a virus scanner or other similar one-touch data. This type of data typically does not benefit the user from

caching, and therefore is not inserted into the cache. Purely sequential data streams (example: streaming a movie file from disk, or large file copies) may bypass the cache, since these often consist of a large amount of one-touch data unlikely to benefit from caching. The cache policy is adaptive to facilitate faster cache warm-up and also to retain good steady state performance, best optimized for long-term system usage.

Flexibility and ease of use

Intel Smart Response Technology is easy to use. It has a simple user interface for easy installation and disk management. For supported platforms that ship with HDD only, the user connects an SSD and enables caching in the Intel® Rapid Start Technology⁴ GUI. That's it! Users do not have to manually manage content, and maintaining single drive letter (i.e., C:\) makes Intel Smart Response Technology simple to use even for the non-technical user. Intel Smart Response Technology works with any SSD—even older ones, as long as it's at least 20 GB in size.

Intel Smart Response Technology requires a RAID-enabled SKU of an Intel 7 Series or 6 Series Chipset, Intel® Core™ processor, Intel® Rapid Storage Technology 10.5 or higher, and an SSD of at least 20 GB capacity.

What is Intel® Rapid Start Technology?

Consumers today want for their PCs to be available quickly. Intel Rapid Start Technology enables systems to quickly resume from deep sleep in about 6 seconds.⁴

Key benefits

- Less waiting—A fast resume time that is more responsive than a fresh Start Up or resume from Hibernate.
- A Smarter Off/On Experience—Instant on and ready to go, a fast and power-friendly alternative to performing a full system startup and shutdown.
- Maintains user context—similar to sleep or standby, a user can return to their previous work, resume Internet activities, restart paused movies, etc.

How it works

Intel Rapid Start Technology consists of a software service, User Interface and BIOS component.

The Intel Rapid Start Technology reduces the amount of system memory that must be saved to the SSD. During the transition to the Sleep state, the service flushes the Standby and Modified memory pages to reduce the amount of memory reported as "in-use." This can considerably

reduce the amount of data that needs to be transferred to the SSD, resulting in improved resume time. Another function provided by the service is optimizing the amount of active pages that need to be written to the SSD. This feature is up to the OEM to enable. Similar to the above example, the service will flush the non-critical active pages during the Sleep transition. Again, this improves resume performance but also reduces the required SSD partition size.

Intel Rapid Start Technology User Interface enables users to configure Intel Rapid Start Technology operation. Configuration options are: Enable/Disable entry based on timer; set the Intel Rapid Start Technology entry timer from immediate transition up to 4 hours after entering sleep; Enable/Disable entry based on critical battery level (laptops only).

Intel Rapid Start Technology BIOS component transfers active memory pages from system DRAM to SSD after the system has been in Sleep mode (S3) for a preset period of time. Lastly, the hardware is transitioned to an S4 power state—enabling an OEM to deliver a zero power standby state—while the operating system remains in its Sleep mode.

During Intel Rapid Start Technology resume, the BIOS component executes based on a wake event; a power button

press or OEM-enabled HID (keyboard, mouse) activity. It quickly reads the memory snapshot stored on the SSD and populates the system DRAM with previously saved active memory pages. The BIOS initiates the S3 resume path and the system resumes as if it was in Sleep mode. User context is restored in seconds.

Intel Rapid Start Technology requires Intel 7 Series Chipset support, dedicated SSD partition, and Intel Rapid Start Technology software and BIOS support. The SSD partition size should be equal to the amount of DRAM in a system.

What is Intel® Smart Connect Technology?

With Intel® Smart Connect Technology,⁵ your system stays current with automatic, no-wait updates of your favorite cloud-based information—e-mail, social networks, news, etc. Now have the freshest data at your fingertips.

Key benefits

- Fresh content from the Internet waits for you
- Cloud contents synchronize with your PC automatically

How it works

While the system transitions to Sleep, the Intel Smart Connect Technology Agent schedules the system to wake up from Sleep (S3) to a lower power state without

waking the monitor at a user-configured time, re-establish network connectivity, and to allow applications to obtain fresh data such as e-mail and social media updates. After content is updated, the system quickly transitions back to Sleep.

During the wake period, Intel Smart Connect Technology OS Service places the platform into a low-power state. This state can be referred to as SOI_{SCT} . In SOI_{SCT} the system is in an active, unattended state (user expected not to be present) with network connectivity and OS running, CPU operating in the lowest P-states, and peripherals, like display, turned off. Typically, the system will remain in this state for 15-20 seconds. With the system in SOI_{SCT} network-enabled applications quickly sync with the cloud during the wake period. Examples of network enabled applications are Microsoft Outlook,* Microsoft LiveMail* and Thunderbird* for e-mail clients and Sobees* and Seismic* for social network content aggregation.

Intel Smart Connect Technology requires an Intel Series 7 chipset, Intel Smart Connect software and BIOS support, and a qualifying Intel® Wireless LAN product (notebook only). A key advantage of Intel Smart Connect being used in conjunction with Intel Smart Response Technology is that the SSD is used to store temporary data while keeping the HDD spun down.

For more information, visit the Intel Web sites: www.intel.com/responsiveness
www.intel.com/smartresponse
www.intel.com/smartconnect

¹ Requires a select Intel® processor, enabled chipset, Intel Rapid Storage Technology software, and a properly configured hybrid drive (HDD + small SSD). Depending on system configuration, your results may vary. Contact your system manufacturer or visit www.intel.com/responsiveness for more information.

² (FTC DISCLAIMER) Software and workloads used in performance tests may have been optimized for performance only on Intel® microprocessors. Performance tests, such as SYSmark* and MobileMark*, are measured using specific computer systems, components, software, operations, and functions. Any change to any of those factors may cause the results to vary. You should consult other information and performance tests to assist you in fully evaluating your contemplated purchases, including the performance of that product when combined with other products.

³ Game Loads Workload: Application and Level load times for mainstream games such as Battlefield* 3 and Call of Duty*: Modern Warfare 3.

System Configuration: (Desktop) Comparing 2nd generation Intel® Core™ i7-2600K Processor (8T4C, 8MB cache, up to 3.8GHz), Intel® Desktop Board DZ68DB, Memory 4 GB (2x2 GB) Corsair® DDR3-1333, EVGA® GTX 580, Driver: 8.17.12.8562 (vendor package 285.62) (BIOS: DBZ6810H.86A.0014.2011.0413.1049, Chipset INF 9.3.0.1019 with the following disk options: 1) Hitachi® ST31000528AS Barracuda*, 1TB, 7200rpm, with Intel RST 10.6.0.1002 2) Intel SSD 311 series, 20GB SRT Cache, Intel RST 10.6.0.1002 3) Intel SSD 510 series, 250GB, Intel RST 10.6.0.1002.

⁴ Requires a select Intel® processor, Intel® software and BIOS update, and Intel® Solid-State Drive (SSD). Depending on system configuration, your results may vary. Contact your system manufacturer for more information.

⁵ Requires a select Intel® processor, Intel® software and BIOS update, Intel® wireless adapter, and Internet connectivity. Solid state memory or drive equivalent may be required. Depending on system configuration, your results may vary. Contact your system manufacturer for more information.

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