

# FieldStrength

Publication for the  
Philips MRI Community

**ISSUE 42 – DECEMBER 2010**

## dStream architecture brings paradigm shift in MR imaging

Digital revolution with better image quality, faster imaging and processing,  
and higher patient throughput



This article is part of FieldStrength issue 42  
**December 2010**

# dStream architecture brings paradigm shift in MR imaging

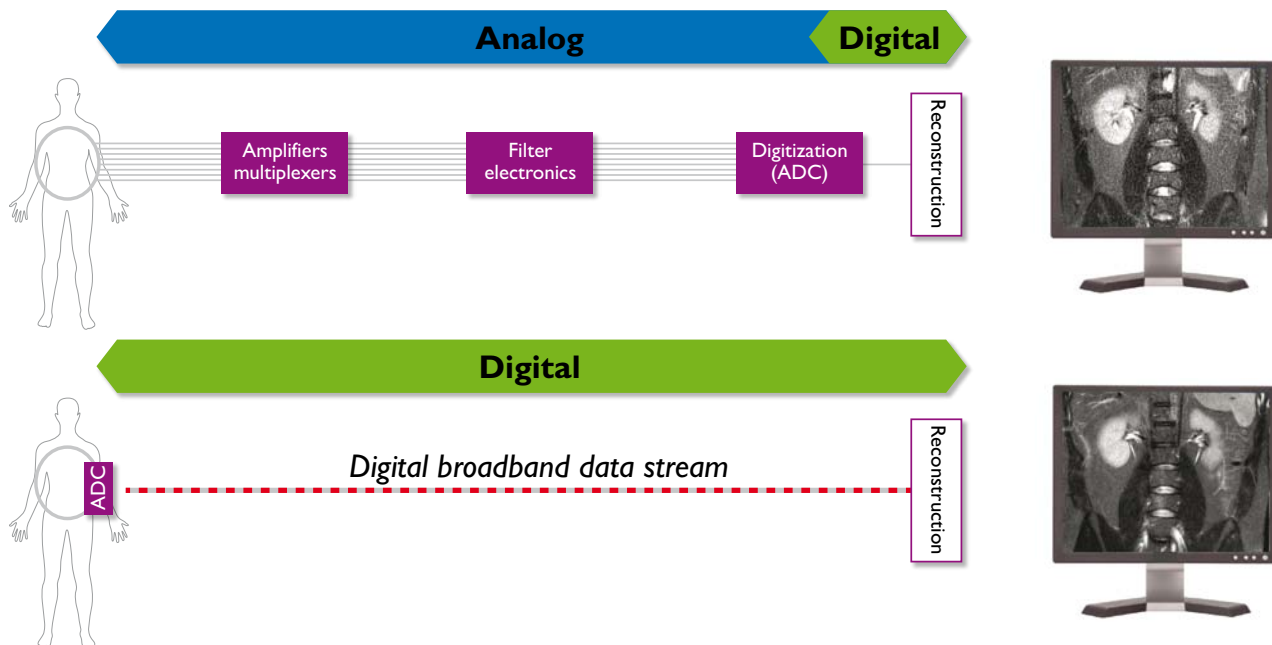
Digital revolution with better image quality, faster imaging and processing, and higher patient throughput



Philips' [Ingenia\\*](#) with dStream architecture with DirectDigital RF provides high purity MR signal, by digitizing the signal directly in the coil on the patient. By digitizing the MR signal directly in the receive coil it can be transported across broadband fiber optic cable to increase SNR by avoiding analog signal loss and noise pickup. Also, by digitization in the coil the system becomes channel independent, so RF channel upgrades are a thing of the past.



## Moving from analog to digital broadband



### Increased consistency and image quality

With digital broadband, more data can be transferred with less interference resulting in higher SNR – this is also applied in modern telephony and high-speed internet infrastructure. DirectDigital RF digitizes the MR signal in the coil on the patient. Transporting the digital signal by broadband fiber optic cable from the coil to the acquisition electronics in the scanner's cabinets eliminates signal losses and noise pickup that typically occur in conventional cables of this length. In other words, the signal clarity is preserved.

In the revolutionary Ingenia system, dStream coils are designed both for fast imaging and high SNR in all images. Better than ever before the coil elements layout is optimized for large coverage and parallel imaging with high acceleration factors. Digitization in the coils, together with broadband signal transport, is essential for obtaining the gain in SNR.

The overall result of the dStream architecture and these sophisticated coil designs is an increase of SNR throughout the whole imaging volume, of up to 40% with respect to conventional MR systems.

### Simplified workflow and improved throughput with dStream

In the Ingenia system, dStream architecture provides a complete set of dStream coils for head-to-toe solutions. The FlexCoverage posterior coil is integrated right underneath the tabletop with neck-to-toe coverage to eliminate coil handling and positioning in about 60% of all cases. The FlexCoverage anterior coil is lightweight and flexible for easy handling and patient comfort, and has outstanding performance with 60 cm coverage. FlexConnect enables single-handed coil connections as well as auto-eject for easy table undocking.

To further simplify workflow during the examination, the system automatically uses coils and elements to maximize SNR. This reduces examination time and increases the reproducibility and consistency among scans. Because of dStream's excellent image quality, patient throughput improves by as much as 30%.

### Channel independence avoids upgrade complexity

Since the signal of all coil elements is digitized directly in the coil, the system receives all signal through one broadband fiber optic cable, no

matter how many elements the coil has. This means that the system can handle coils with many elements as easily as coils with few elements. In other words, the system is indifferent to the number of coil elements.

In traditional MR technology, an 8-channel system can only handle receive coils up to 8 channels; in order to support a 16-channel RF coil, an upgrade to a 16-channel platform is required. But with digitization moved to the coil, a truly channel-independent system is created; the number of channels is not a system specification anymore.

### Future-proof architecture

The increased efficiency and throughput with excellent image quality, make dStream architecture the future of next-generation MRI systems.

With dStream there is no need for upgrading system RF receive channels to keep up with advances in coil technology. This enables easy expandability of clinical capabilities without major system overhauls, resulting in lower lifecycle costs and improved economic value. ■