VICOR

Case study: 5G indoor small-cell base station

High density power allows for unobtrusive base station

Customer's challenge

The demand for mobile data, video and music streaming has increased wireless network demand exponentially, and 5G networks are expected to provide the necessary increased network capacity. The higher bandwidth required of 5G connections limits the range of base stations, necessitating a higher density of antennas, especially in buildings where radio signals have limited penetration. The key goals for this indoor base station were:

- Improve aesthetics and simplify installation by reducing system footprint, profile and weight
- Antennas needed to be powered over PoE from existing building cabling, requiring isolation
- Scalable design to accommodate future power needs

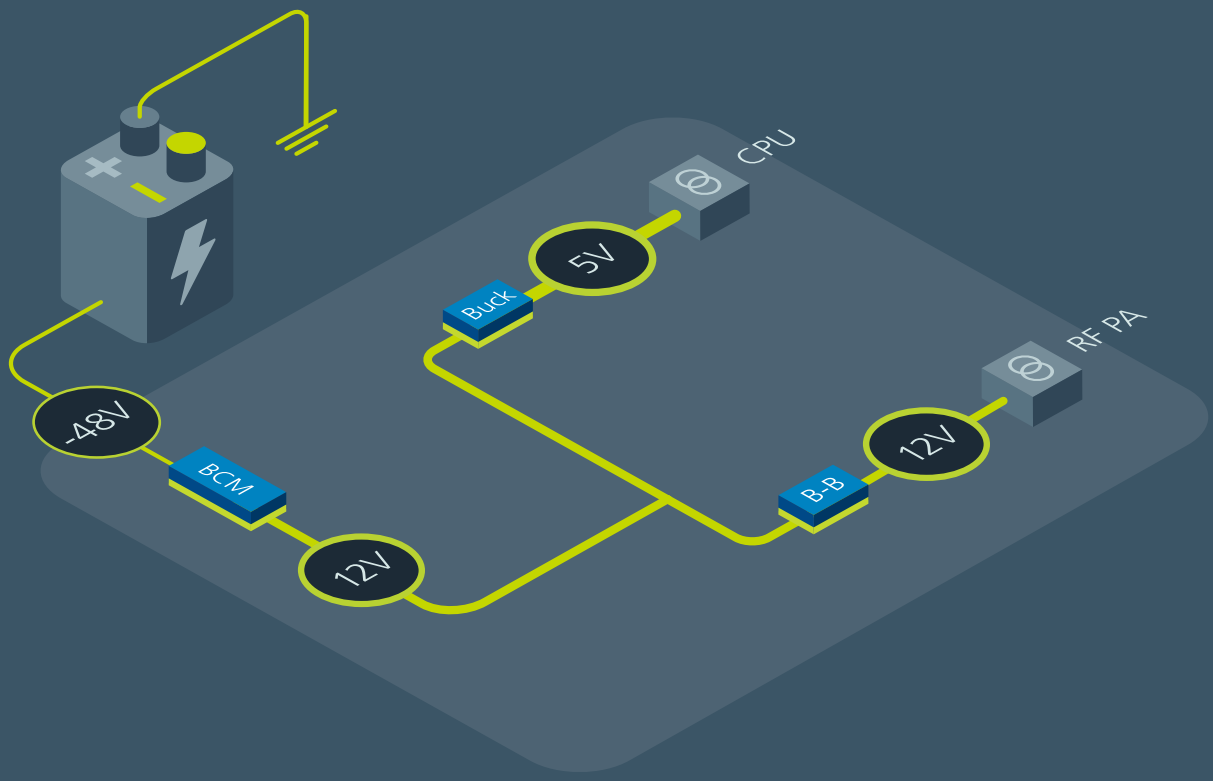
The Vicor solution

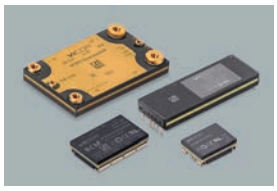
Size and weight objectives were met by using BCM bus converter modules and ZVS Buck regulators, both utilizing high switching frequencies for a very power dense solution. Further space savings were achieved as Vicor's proprietary Sine-Amplitude Converter topology increased efficiency, reducing cooling requirements even at high ambient temperatures. Key benefits were:

- Reduced footprint of just 6.4cm^2 and profile of <7mm enabled by high-density converters
- Operation at high ambient temperatures requires little cooling due to high efficiency topologies (>94%)
- Scaling to meet future requirements straightforward as converters are easily paralleled

Vicor power modules provide high power density and high efficiency

The Power Delivery Network: A half-chip BCM Bus Converter (K=1/4) measuring just 22 x 16.5 x 6.7mm was used to provide the isolated 12V rail. A ZVS Buck regulator provided the regulated 5V rail to the processor and a ZVS Buck-Boost regulator provided the precisely regulated 12V rail to drive the RF power amplifier stage. Both regulators measure a compact 14 x 10 x 2.6mm. To analyze this power chain, go to **Vicor Whiteboard** online tool.





BCM® bus converter

Isolated fixed-ratio
Input: 800 – 48V
Output: 2.4 – 55.0V
Current: Up to 150A
Peak efficiency: 98%
As small as 22.0 x 16.5 x 6.7mm

vicorpower.com/bcm

ZVS buck regulator

Non-isolated regulated
Input:12V (8 – 18V), 24V (8 – 42V), 48V (30 – 60V)
Output: 2.2 – 16V
Current: Up to 22A
Peak efficiency: 98%
As small as 10.0 x 10.0 x 2.56mm

vicorpower.com/buck

ZVS buck-boost regulator

Non-isolated regulated
Input: 8 – 60V
Output: 10 – 54V
Power: Up to 150W continuous
Peak efficiency: 97%
10 x 14 x 2.56mm

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