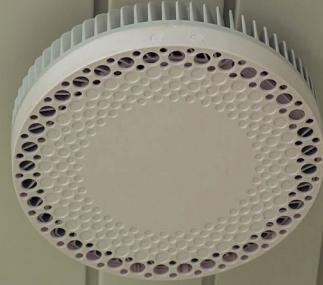


Case study: 5G indoor small-cell base station



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



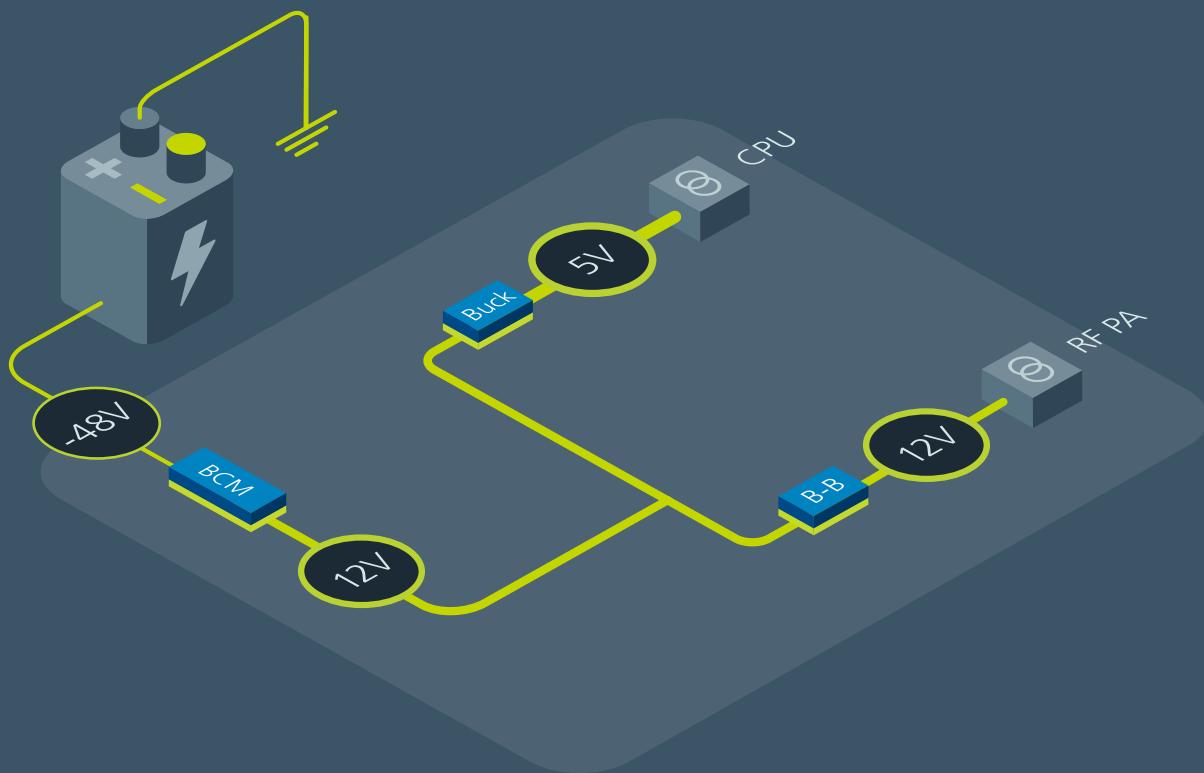
The Vicor solution

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 6.4cm² 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.



ZVS buck-boost regulators

Input: 8 – 60V
Output: 10 – 54V
Power: Up to 200W
Peak efficiency: Over 98%
As small as 10 x 14 x 2.5mm
vicorpowers.com/buck-boost



ZVS buck regulators

Inputs: 12V (8 – 18V), 24V (8 – 36V), 48V (30 – 60V)
Output: 1 – 16V
Current: Up to 22A
Peak efficiency: Up to 98%
As small as 7 x 8 x 0.85mm
vicorpowers.com/buck



BCM bus converter modules

Inputs:	36 – 60V	38 – 55V
200 – 330V	200 – 400V	240 – 330V
260 – 410V	330 – 365V	360 – 400V
400 – 700V	500 – 800V	
Output: 2.4 – 55V		
Current: Up to 150A		
Peak efficiency: Up to 98%		
As small as 22.0 x 16.5 x 6.7mm		
		vicorpowers.com/bcm