

# Prolonging the Battery Life in WiFi Applications

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WiFi has already been widely adopted in many applications; besides massive use in laptops and notebooks, it has also spread to the WiFi phone and VoIP applications. According to an authoritative report from Infonetics Research in 2007, the global distribution quantity of single mode WiFi phones had increased from 358,000 units in the previous year to 682,000 units, with a rate of growth of over 190% expected. However, WiFi/GSM Dual Mode VoIP phones are expected to have an even more rapid growth. From 2007 to 2010, the sales of these phones could increase by as much as 1300%.

As WiFi applications become more popular, the coverage of the WiFi network becomes broader. More WiFi applications will emerge in logistic management, home automation, building automation management and other portable devices. Portable Mobile Electronics is cited as being one of the growth engines utilizing WiFi technology, and the requirement for a longer battery lifetime will be one of the top priorities in these applications.

## How to improve Battery Life?

There are three options to prolong battery life; increasing battery capacity, reducing WiFi product power consumption, and through feasible control methods.

Increasing battery capacity is very simple; however, because of the technological limit, it may lead to a dramatic increase in the cost and physical size of the battery. Consequently, the other two options – reducing the power consumption of WiFi products and adding power control features – are relatively more feasible. To achieve low power consumption or even ultra low power consumption for WiFi

products, an ultra-low power SoC has to be selected. The key features of three ultra low power WiFi chips which have gained relative popularity in the industry are listed in *Table 1*.

Part no.	GS1010	BCM4328	STLC4560
Vendor	Gainspan	BroadCom	ST-NXP
Single Chip	Yes	Yes	Yes
Core	ARM7	ARM7	ARM9
Power Receive (mW)	-	295	275
Power Transmit (mW)	-	425	715
Power Sleep (mW)	0.018	5	1.5
Power wise	Yes	Yes	Yes
Battery Life Enhancement	Yes	No	No
RF Circuit	simple	complex	complex
Bluetooth	No	Yes	Yes
Package	QFN102 (10 x 10 x 0.85 mm)	FPGA (10 mm x 10 mm)	LFBGA240 (8.5x8x1.4mm)
Software Support	GREENHILLS, Keil, MDK, ARM,	WinCE, Linux, WinXP	Symbian, WinCE, Linux

Table 1

RF circuitry design for the GS1010 is very simple (one 0805 part is required), so that even a system designer who has no RF experience can complete the design easily. And because the GS1010 has an excellent battery life function, it consumes only 18<sup>2</sup>W in sleep mode. Gainspan claims that GS1010 can be powered for five to ten years on a single AA battery (depending on application).

The BCM4328 and STLC4560 both offer many advanced features and are provided with good software support. Therefore, designing a complex system which is software intensive (e.g., WiFi phone), the 328 or STLC4560 would more likely be chosen. But for simple and low cost applications like a wireless sensor network, the GS1010 would be the better choice.

As shown in *Table 1* and *Figure 1*, there is a vast gap in power consumption between active mode and standby mode. Based on that phenomenon, an idea for saving power is to prolong the time of standby, and shorten the time of the active cycle.

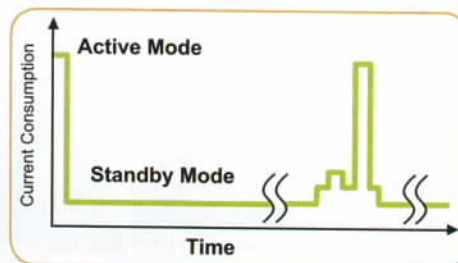


Figure 1

This requires designers to set up the response conditions accurately according to the request for system performance, reducing the possibility that standby mode might be triggered by the system into active mode by mistake, and ensuring that the system returns to standby mode after all tasks are complete.

The techniques of low power consumption can dramatically prolong the battery life, but sound design solution is absolutely necessary to achieve this. ■