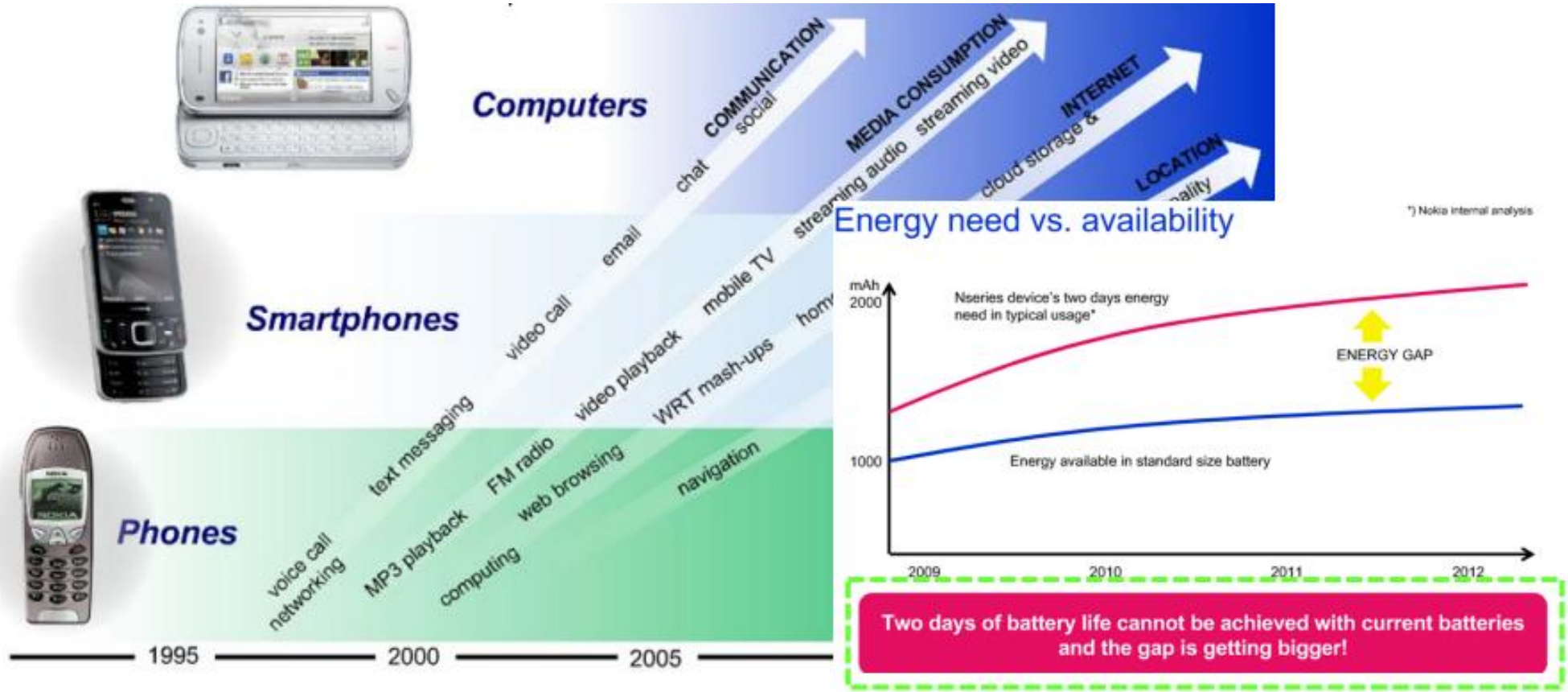
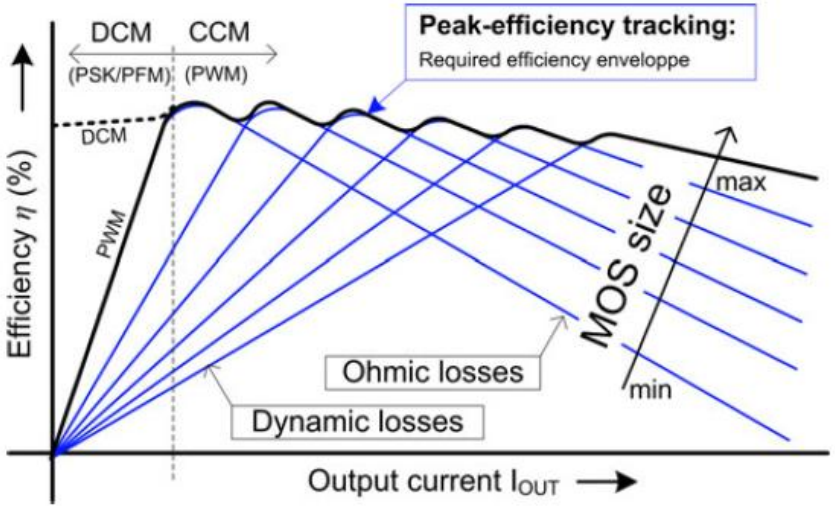
電源管理背景 (1/2)

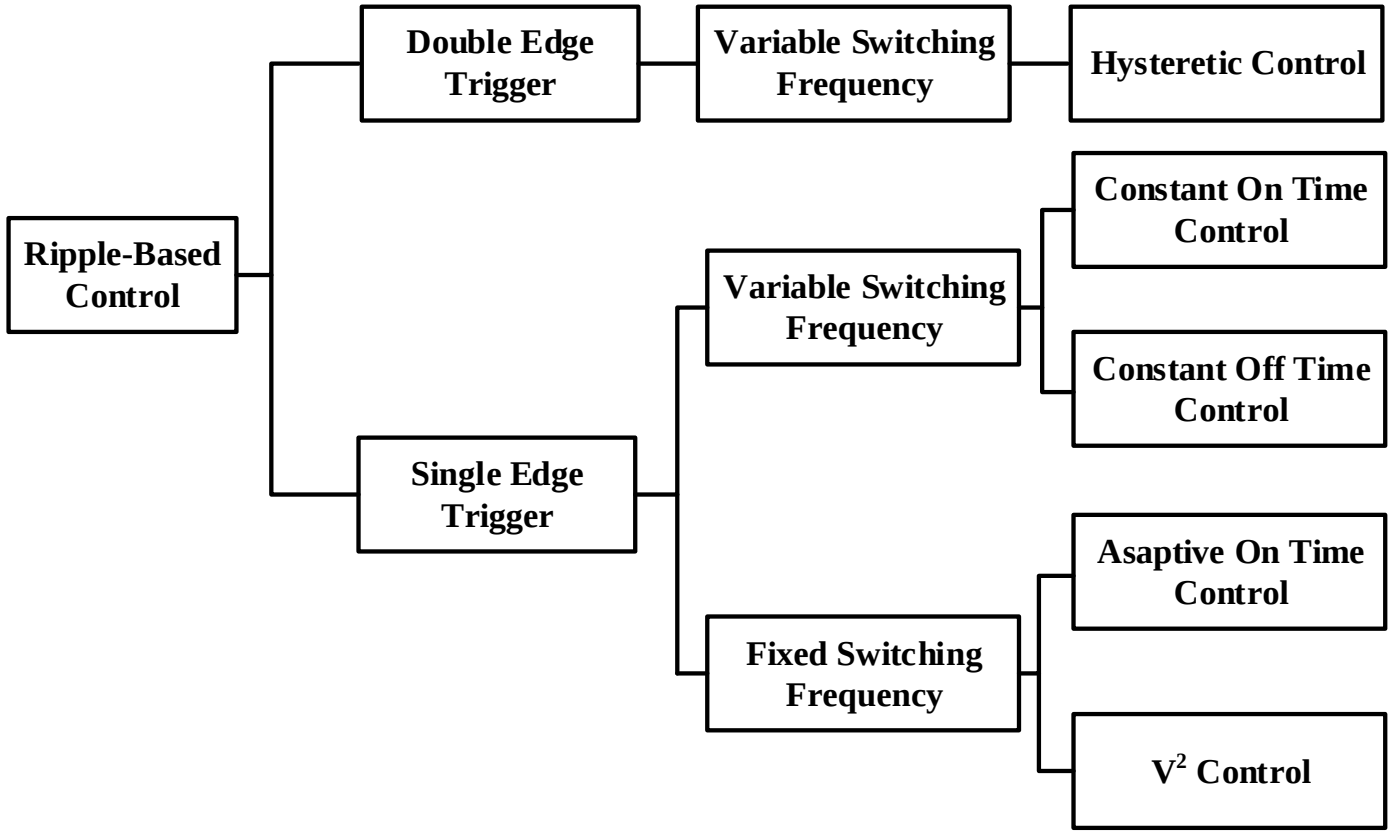
- 多功能且輕薄短小是消費者本位的實踐
  - 多功能 ➡ 更多功能的加入導致功耗提升
  - 輕薄短小 ➡ 限制並且縮小電池儲能多寡
  - 合宜的待機時間成為理想鄉 ➡ 提升效率



電源管理背景 (2/2)

- 極輕負載 (ultra light load case)
  - 切換損失
  - 控制電路功耗
- 對策
  - 減少切換頻率 ⇒ 變頻
  - 控制電路精簡化 ⇒ 單緣觸發



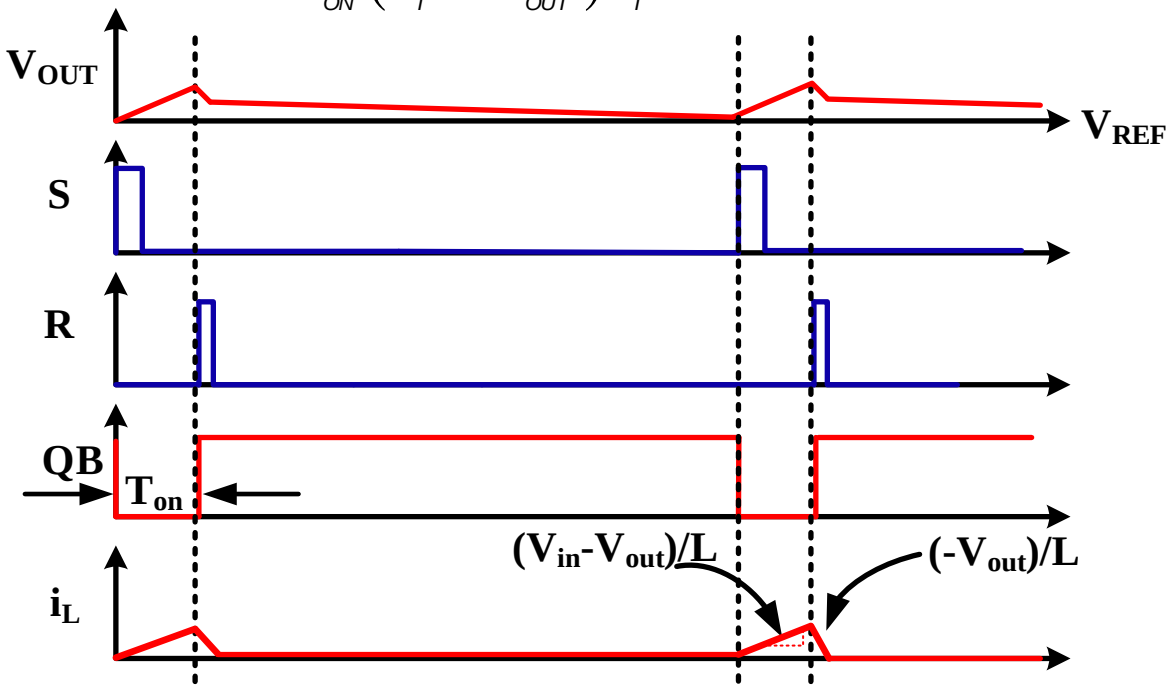


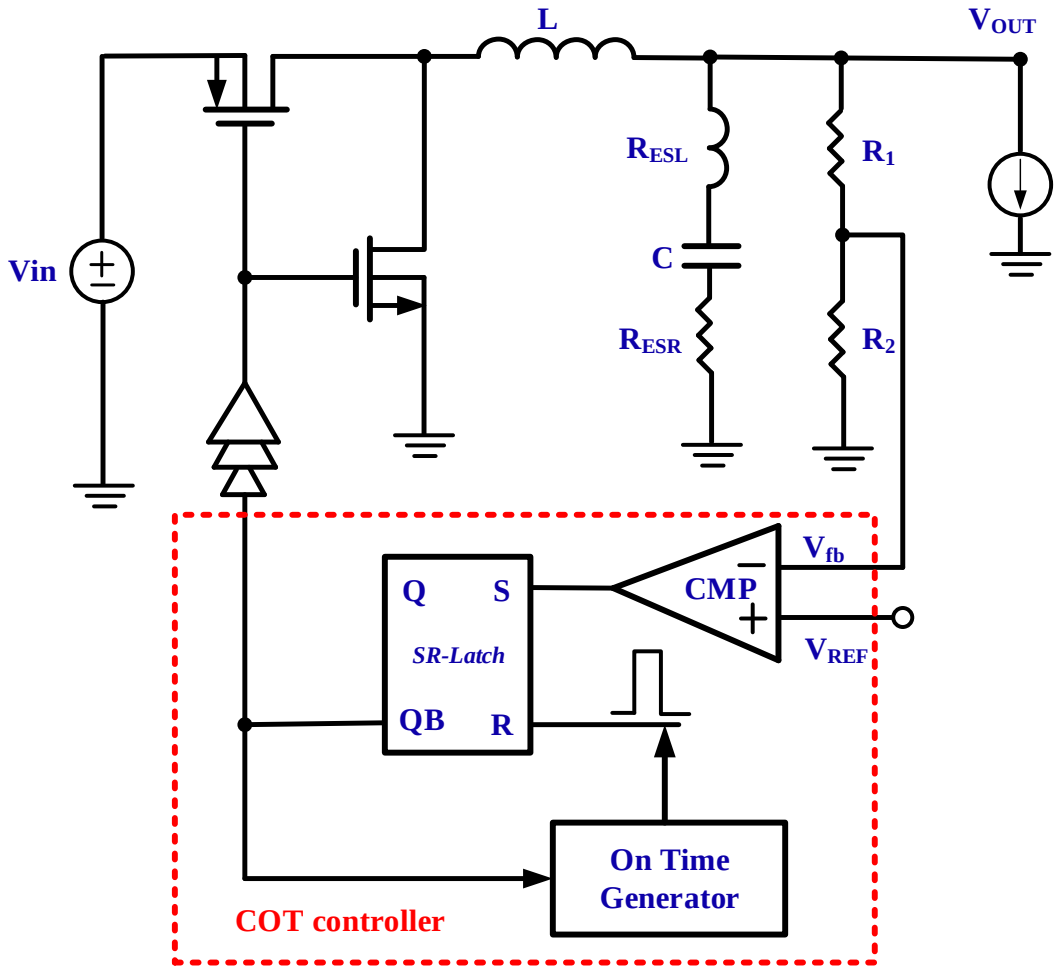
（Fig referenced by Peak-Efficiency Detection and Peak-Efficiency Tracking Algorithm for Switched-Mode DC–DC Power Converters IEEE TRANSACTIONS ON POWER ELECTRONICS, VOL. 29, NO. 12, DECEMBER 2014)

Constant On Time Control (1/2)

- 架構特色
  - 單緣觸發
  - 變頻
  - 谷值電壓控制(Valley Voltage Control)
  - 具快速暫態響應

$$f_{S.DCM} = \frac{2 \cdot L \cdot I_{OUT} \cdot V_{OUT}}{T_{ON}^{2}\left(V_I - V_{OUT}\right)V_I}$$

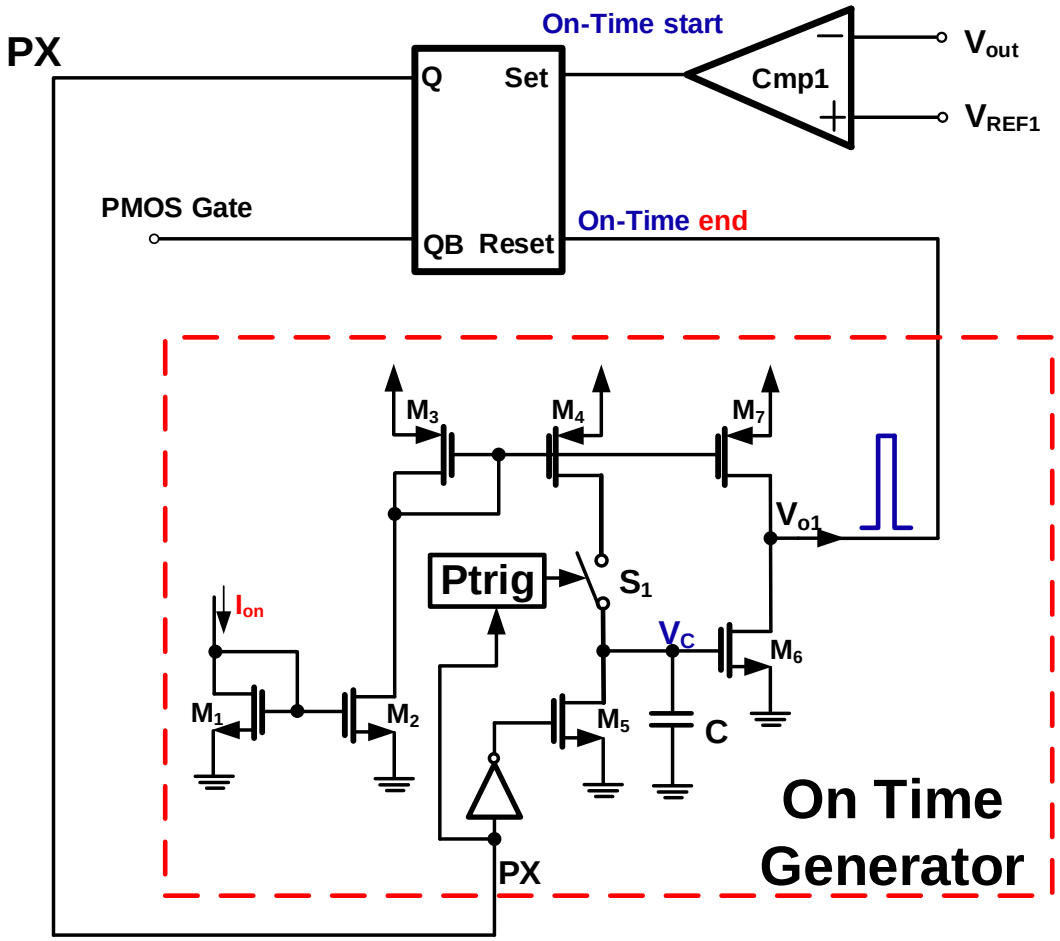




（固定導通時間控制電路架構）

Constant On Time Control (2/2)

- Control Method
  - Signal depend on Q to trig ONTG



- Design Formula
  - Ideally set the $V_{GS} = V_{OUT}$

$$V_c = \frac{1}{C}\int I \cdot dt$$

$$T_{on} = \frac{V_{th6} \cdot R_{BIAS} \cdot C}{V_{in} - V_{GS}}$$

  - T_{on} depends on V_{th6} R_{BIAS} C

Set	Reset	Q	QB
0	0	Q	QB
0	1	0	1
1	1	1	0
1	0	1	0