



## RTT TECHNOLOGY TOPIC December 2013

### Low Cost LTE

In 1827 Guinness started selling their Foreign Extra Strong Stout to Africa. It is no accident that the iconic Guinness brand icon, the toucan, is an African bird. In 2007 Nigeria overtook Ireland as the world's number two market for Guinness behind Great (Drinking) Britain. In the intervening 180 years Africa has heroically consumed vast quantities of the alternative black gold.

<http://www.theglobalbrandonline.com/brand-success/brands-grow-over-time/guinness/>

In 1965 the Chinese government offered to sponsor the construction of the railway line linking Tanzania (ruled by President Julius Nyerere) and Zambia. Fifty years on Chinese vendors are strategically well placed to service fast growth African telecom infrastructure, user device and service provider markets with the side benefit of preferential access to Africa's mineral resources.

<http://www.lse.ac.uk/IDEAS/publications/workingPapers/altorferOng.pdf>

Return on investment (ROI) time frames of 50 years are not concordant with contemporary Wall Street or European investment expectations though are consistent with a working life time, a fact that most pension funds appear to have missed or ignored.

Servicing low value but potentially high volume (and over time rising value) markets at the same time as established high volume high value markets is possible provided the large differences in ROI time scale are understood and accommodated.

In this month's technology topic we discuss the need for low cost LTE and the related implications for conformance and performance standards.

In September's technology topic we talked about high band count LTE user devices including phones aggregating two or three simultaneous radio carriers (LTE and/or Wi Fi). When implemented in smart phones these devices deliver high per user data rates with the caveat that users need to be relatively close to a base station or access point to take advantage of higher order modulation schemes and low overhead channel coding.

We highlighted the trend towards LTE RF integrated circuits with port support for 15 LTE bands and longer term support for 22 bands for LTE Advanced.

This is in response to a stated need by multinational or large regional operators to accommodate all FDD and TDD bands within all addressed markets.

The difficulty is that multinational and large regional operators have individually specific band and technology requirements including legacy technologies (GSM, HSPA, and CDMA). This adds costs and complexity to the RF component and system supply chain.

This is reflected in ever increasing Non Recurring Engineering (NRE) RF front end (RFFE) and associated system support costs which are increasing by an order of magnitude every decade. This is not a problem if these NRE costs can be amortised over a sufficiently large market by volume and value but typically means that the OEM community will service high volume high value markets with high volume low value (low ARPU) markets as a secondary priority.

As a result LTE smart phones are too expensive to be sold in volume into what are misleadingly called 'developing economies', 'third world' or 'emerging' markets.

Additionally, high band count phones will generally have mechanical design and space constraints which compromise antenna performance resulting in lower isotropic sensitivity and reduced total radiated power.

They are thus non optimum for use in the sparser networks which are needed to reduce network costs in low ARPU markets or to service markets with deep rural coverage requirements, Australia for example, but also large parts of Africa, Latin America and Asia.

One solution is to develop tailor made products for these markets that deliver good RF performance (enhanced data reach) at low cost. By default these are likely to be low band count devices but could also for example be Category 0 devices working half duplex to reduce front end filter costs (and front end filter insertion loss).

There may also be merit in considering VHF LTE for these markets, for example with a 3 MHz carrier or more radically taking individual resource block sub carrier channels (7.5 or 15 KHz) and implementing LTE at long wave, medium wave or short wave, in effect replicating the approach being taken by Digital Radio Mondiale to replace AM and FM broadcasting in these lower bands. The difficulty here is that previous attempts to produce tailor made ultra-low cost user devices have not ended well.

The GSMA competition in 2007 to produce an ultra-low cost (sub \$30 dollar) handset is a relatively recent example. The competition was won by Motorola and TI. Delivering the cost target required an exceptionally high level of integration (at the time) which translated into \$250M of time to market risk. As a consequence Motorola, once the world's largest most successful handset manufacturer is no longer an independent entity and TI, the biggest supplier of GSM baseband in the 1990s, exited the market.

Simply stated, the ROI achievable from low value markets with high growth potential high low value is substantially higher than that achievable from high volume high value markets particularly if the high volume high value markets are close to saturation. It just takes longer to realise the return.

There are of course a number of similarities between the drinks industry and telecommunications industry. Both industries are built on addiction and dependency. Both industries have relatively long ROI cycles (think of those 40 year old malts maturing in Scottish whisky distilleries).

The Guinness Brand is now owned by Diageo, the world's largest drinks manufacturer. Over 40% of Diageo sales are from emerging countries.

<http://www.thisisafricaonline.com/Business/Strong-demand-for-Scotch-in-Africa-bucks-trend>.

Not a bad return on a 180 year investment.

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## About RTT Technology Topics

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[http://www.rttonline.com/tt/TT1998\\_008.pdf](http://www.rttonline.com/tt/TT1998_008.pdf)

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