

EXORCISING THE DEMON

\$3.50



"Sorcerer" by Frank Frazetta

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"...He was not himself until the battle began to go against him; then, when the dead began to fall in ranks around him, awoke his powers of combination, and he put on terror and victory as a robe".

Ralph Waldo Emerson, The Divinity School Address, 1838, Speaking of Marshal Massena

We think it is fair to say that xG shareholders have had their fair share of terror in the last few months. From an intraday high of \$19 back in April, the shares broke sharply in July and have been sliding since, relentlessly and in disregard of reasonably positive newsflow. They are currently near the post-IPO low.

The current paper is a holding note, the purpose of which is to spell out exactly where we believe xG to be currently and to explicitly interpret very recent newsflow. We believe that the market has not realised the full implications of that newsflow - specifically the announcements made on 21st and 27th December 07 and, most importantly, on 14th January 08. We think these mark a dramatic turnaround in the strength of xG's market proposition - analagous to the battlefield turnarounds executed by Jean-Andre Massena, who is the referent of Emerson's wonderful quotation above. That great General, like his master, Napoleon, was characterised by his ability to detect decisive change in what appeared a lost position. We think that recent newsflow marks such a change. There could not be a more battlefield like background as well, in the behaviour of current markets.

In particular, we believe that the appropriate discount rate applicable to xG has fallen markedly. That means that the intrinsic value of the company has increased by probably a multiple, even as the price tests lows.

Currently, Hichens have no forecasts extant on xG. We will be releasing new forecast numbers after the company reports FY07 in March, together with a full update note. But in the light of these announcements, we believe that fixating on forecasts, phone deliveries, the initial network etc...misses what is essential-and is in fact exactly the same species of mistake that Western Union made when discounting Alexander Graham Bell's invention of the telephone in the 1870s.



Background and market disappointment

We interpret market expectation for 2007 as likely to have been centred on an xG operator-customer succeeding in setting up a commercial grade mobile VoIP network (utilising xMax base stations or “BTS”), with a critical mass of consumers using their handsets. We unfortunately contributed to augmenting the quantification of this expectation when we upgraded 07 and 08 forecasts following a visit to xG’s labs in March 07. At that point we believed the company was bang on schedule. We had experience going back to 2004 of xG without exception, either meeting, or exceeding, timelines in their technical development. In addition, we made a “wired” international VoIP call using a prototype xMax handset and were extremely impressed with the call quality. So we were very encouraged and upgraded aggressively.

(One is minded of comments by Warren Buffett, who said that if he set an exam question asking for the valuation of an internet company, he would fail anyone who tried to answer it! Similarly, any attempt to forecast pre-revenue technology company cashflows only serves the purpose of making fairground fortune tellers look good. Nevertheless, a valuation can be derived via making explicit what is implicit in the share price (using reverse DCF). And it is clear that if xG is commercially successful, cashflows will be gigantic.)

But the demonstration of network success failed to happen. The company suffered a number of problems relating to network architecture - such as BTS handoff whereby a mobile phonecall is seamlessly maintained when moving from the vicinity served by one BTS to another.

There were a number of such issues, though we noted by the summer that while we had withdrawn forecasts in recognition of an uncertain period of delay, that each issue pertained to *corrigible* operational issues and *not to the core technology*. It is fair to say that a large and experienced telecommunications operator may well have taken the issues in their stride.

Territorial Partnership Exclusivity Agreements

Maxwell's Demon

Statement of the Shannon Hartley theorem

Considering all possible multi-level and multi-phase encoding techniques, the Shannon–Hartley theorem states that the channel capacity C , meaning the theoretical tightest upper bound on the rate of clean (or arbitrarily low bit error rate) data that can be sent with a given average signal power S through an analog communication channel subject to additive white Gaussian noise of power N , is:

$$C = B \log_2 \left(1 + \frac{S}{N} \right)$$

where

C is the channel capacity in bits per second;

B is the bandwidth of the channel in hertz;

S is the total signal power over the bandwidth, measured in watt or volt²;

N is the total noise power over the bandwidth, measured in watt or volt²;

and

S/N is the signal-to-noise ratio (SNR) or the carrier-to-noise ratio (CNR) of the communication signal to the Gaussian noise interference expressed as a straight power ratio (not as decibels)

source-(http://en.wikipedia.org/wiki/Shannon_hartley)

In addition, xG had announced a period of exclusivity in respect of possibly concluding deals with 2 large telecommunications players - National Grid Wireless and Telefonica, and Gama, a Middle Eastern infrastructure investment company. When news of these deals was not forthcoming through the year, or news of any other tie - ups, the markets began to mark the company's stock down aggressively.

To summarise, the market had not received any proof, either by partnership with a recognised industry player or by demonstration of a working network, that xG had a commercially valuable proposition. In particular, the VoIP application chosen by the company as its initial showcase for its core technology was seen as very challenging in its own right.

Please note that we have chosen our words carefully. We say that the market had no proof of a commercially valuable application. We, perhaps naively, didn't think the market needed proof that the technology worked at all.

We say this as Hichens had assessed xG as a suitable investment on an expected value basis - that is, we suggested that even on a small chance of success, the payoff for such success (100s to 1000s of %) would massively outweigh the penalty for failure (100%). (To be clear, we thought there was a good to excellent chance of success, and are even more convinced now). To do so, we had to be sure there was at least some small chance of success.

For example, if someone came to us with a company offering a perpetual motion machine, we would be uninterested in marketing it, even though the payoff for success would be in the millions of %. This is because success is impossible. As physicist James Clerk Maxwell demonstrated long ago via his "Demon" thought experiment, a perpetual motion machine implies a violation of the second law of thermodynamics.

(Source- http://en.wikipedia.org/wiki/Maxwell%27s_demon)

So, in 2004-06, we needed to make sure that we had no demon to exorcise and that SCM or Single Cycle Modulation, the core modulation technique behind the xG technology, was not demonic! That is, that the technology could at least theoretically work. We satisfied ourselves of that on two grounds-

Firstly, we noted that a demonstration had been carried out in November 2005 which showed that SCM technology could carry a greater than 3G data load over 18 miles on a 50, 35 and lower MW signal. We are not electronic engineers and did not know if that indicated a competitive edge in itself, but it did prove that SCM, at least basically, worked as a signalling technology. At that early stage, when the circuitry had only just become available to allow the demonstration, efficiency increases seemed possible later.

Secondly, we relied on the opinion of Professor. Stuart Schwartz, formerly Head of Electronic Engineering at Princeton. Professor Schwarz was one of the very few outside the company to know how SCM works. Professor Schwarz confirmed again that the technology did not violate physical law, specifically the Shannon-Hartley Theorem, which states that there must be a certain minimum level of power required to send a bit of information a certain distance in a certain noise laden environment. This "Shannon Boundary" indicates the limit to signalling efficiency.

At the same time Professor. Schwartz indicated that xG's technology did, nevertheless, theoretically promise more efficient communication applications, though he explicitly offered no opinion as to whether they could succeed with a commercial offering.

We suggest that recent newsflow obliquely offers proof that they have succeeded with such an offering. The company has succeeded in getting to the commercial stage and the venture capital risks investors have taken in prior commitment have now dissipated, to be replaced with normal operational, development and commercial risk (as we shall argue though, these operational etc..risks are strongly offset by the fact that if xG can commercialise at all, then they possess a threat to other communications technologies by the mere fact that, is possible). In other words, we are now likely to be in a position to judge xG on fundamentals and we would suggest that the appropriate discount rate has dropped very sharply, even as the price declined. Not only does the technology work in theory, but the company have delivered a first commercial application.

Recent Newsflow

The company has released three pieces of news since mid-December. There were two items on mooted partners and one on its commencing shipments of base stations.

Territory/Partner announcements

On 21st December and 27th December xG updated the Market on progress relating to two of the three firms to whom they had granted a territorially based exclusivity agreement. National Grid Wireless was granted an extension to March 08 to conclude a commercial agreement for the UK. Gama Group was also granted an extension to June 08 for Turkey. (We understand that negotiations are also continuing with Telefonica for Mexico and that Telefonica has been granted a verbal extension.)

The most important information in these announcements was that both official extensions had been granted in the context of the potential partners having completed or nearly completed technical due diligence on xG's technology. The extensions are to allow development of a commercial partnership to exploit the technology. This is strong corroboration that there is, at the very least, significant commercial potential in xG's technology in the opinion of experience telecommunications market participants.

If so, the company is worth many times what it is selling for today.

14th January 08
Announcement-
commencement of network
equipment shipments.

Is xG profitable already?

On 14th January, xG announced, that it had begun shipments of BTS to new customers in markets in 4 states. The implications of what was a single sentence announcement are manifold and highly significant. We believe that they indicate another dramatic drop in risk in holding the stock and in fact indicate that xG should now be judged as a commercial enterprise. The technology debate looks to be over at least in the judgement of numerous customers and the organisations cited above. This anomalously coincides with a low in the stock price. **We think that the recent market turmoil and timing of the December announcements {on the quietest trading days of the year} have led the market to miss or underweight the implications of these very significant developments.**

These implications are:

1. The statement refers to new "customers" - not potential customers. That means they paid for the base stations. This in turn indicates that the technical problems which caused earlier delays have been corrected. We understand that this is indeed the case and have been told that customers have been invited to test signal robustness while driving. These tests indicate that the BTS outperforms, for example, a \$100,000 GSM BTS on range, power efficiency, capacity and cost.
2. It refers to markets in 4 states - we don't know how many markets but we know there are at least four. Unfortunately, the industry classification of the customers is not known - ISPs, Clecs, Telcos etc.
3. We also don't know how many BTS were sold, but we can be fairly certain that there is a likely minimum needed for each market and that this will be around 8 - 12. Hence, xG sold at least 32 BTS. Far Reach had 6 BTS for the first beta network last April and this was for an extremely small test market.
4. We know that the price of each BTS is \$50,000, unless purchases were made greatly in excess of the numbers above. That implies at least \$1.6m in revenue. Although yet to sign up an OEM, certainly xG has the capacity to ship such orders quickly, so it is likely that this revenue will be recognised this month.

So,

Gross margins on BTS are around 95%, actually a software margin, quite properly as the technology is an entirely IP development. xG's cash overhead each month is about \$800-900k (it has no cash issues with over \$30m in the bank) so it seems likely that xG has reached profitability already.

If this announcement established a run rate, xG is selling on a double digit PER and possibly a low double digit PER without any consideration of further growth, modem, phone or territory sales, or the customer annuity stream.

If we are right we need to know if profitability will be maintained. Management



Is a run rate established?

indicate a very high level of enquiries and we understand that there is good order visibility going forward.

This seems augmented by recent spectrum auctions in the USA in January. Bidding was on the 700 MHz band. Approximately 260 companies applied to participate in the auction and only 214 of these were accepted as bidders. Out of these 214, only a small minority can be successful.

Content companies, in particular, must strongly position themselves in spectrum auctions - the Department of Justice [DoJ] has decided to allow differential pricing by the incumbent duopoly of PSTN and cable companies to access content. Content companies therefore desperately need a 'last - mile' wireless solution to bypass this duopoly - spectrum is just part of the picture. They also need technical infrastructure - the elephant in the room is that there is no conspicuous solution in this bandwidth. This goes for both content and other companies.

Of the only two solution candidates, WiFi and WiMax, neither is economically feasible and neither perform well on any kind of city-wide deployment. Earthlink recently admitted this in respect of WiFi, while WiMax trials are beset with range and capacity problems which are only likely to worsen in sub-gigahertz spectrum. The losers in this auction are very likely to be amenable to another avenue, such as a solution for the non-licensed 900MHz band. xG possess the only usable solution for this band due to FCC interference regulations. xG's technology is uniquely suited to this band as it does not interfere with other signals on the spectrum. xG's BTS handles both voice and data applications, i.e. it can form the backbone of a wireless broadband architecture.

But what about the Phones?

xG have ordered an initial batch of Generation 1 phones, which are being developed by Lundinova in Lund, Sweden. Similarly to the BTS situation, the handset development has had teething problems. Specifically, the user interface [UI], software which allows users to navigate and use the phone's features is proving difficult to debug and, as a result calls often crash.

The Generation 2 phones are being developed by Cambridge Consultants. The final design is contracted for delivery to the OEM by July. The Gen 2, called the TX 60, is aesthetically much more pleasing and smaller than the Gen 1 phone. We understand that this phone is considerably more advanced and has much more robust UI software.



xMAX TX60
MOBILE PHONE

Given that it takes some 10 - 12 weeks to "map" out a territory for BTS placement, we do not see that phone considerations should cause us to expect a fall in BTS sales in the meantime. (Incidentally, xG has developed a proprietary mapping software called xDrive, which builds on Google Earth). In fact, the best proof of this is that millions of dollars of orders are being shipped currently.

It is also worth highlighting that mobile VoIP is just an initial application, in fact not even the first, as well as wireless broadband into the home. Sole focus on the VoIP application runs a severe risk of underestimating the potential of the company. ***This would be precisely the same mistake that Western Union made when it refused to purchase Alexander Graham Bell's telephone patents in the 1870s for \$100,000.***

They did so because Bell's invention only had a short range (Western Union was telegraphing data over the continent), had no customers, poor voice quality, was portrayed by the inventor himself as a novelty and only had a prototype sample. Western Union could not anticipate the severe disruption to their business that would occur shortly afterwards - within a year and a half of incorporation, Bell's company, which became AT&T, had tens of thousands of customers and subsequently went on to outstrip Western's net income by many multiples. (see Christensen, Anthony, Roth's "Seeing Whats Next" for an intriguing review of this disruptive breakthrough. Harvard Business School Press, 2004).

Valuation and Conclusion

Certainly, xG has suffered delays measurable in months but have made outstanding technical progress by any objective measure - certainly in comparison with the technologies most often cited as competitive. As the New York Times (we think this was the source) put it - "WiMax has been 2 years away for 6 years". It is still years away and looks destined to disappoint - the technology is beset with range, interference and throughput problems. (For sources for this claim a simple Google search lists too many to list.) It has been candidly admitted by backers of WiFi that for wide area mobile applications, such as Earthlink, WiFi is nowhere near being an economic city-wide solution and clearly suffers severe interference when used out of doors. (eg reference- <http://www.sfgate.com/cgi-bin/article.cgi?f=/c/a/2007/08/30/MNEJRRO70.DTL>). Skype is on the record that fully mobile VoIP is 3 - 4 years away. (e.g. reference-<http://www.dslreports.com/shownews/Skype-Faces-Obstacles-in-Going-Mobile-90943?nocomment=1>)

So, in context, xG's delays are extremely minor for the tech industry.

We are not providing fresh forecasts until March but we think that we can provide readers with some helpful hints on xG's valuation and investment merits. If our reasoning above is correct, xG is making significant profits and is selling on a medium or low double digit PER on run rate. Layering of modems, phones, annuity streams, territory sales and growth in BTS sales are excluded from this consideration. If included, the company would be spectacularly cheap.

Tom Gats, in his excellent "Trading and Valuing Internet and High Tech Stocks", tabulates discount rates for various stage companies (page 98) as follows:

Seed Stage -	Initial idea and R&D Discount rates of 75-100%
Start up stage -	product development and initial marketing Discount rates of 50-75%
Early Stage -	Initial sales Discount rates of 35-50%
Later stage -	Run rate sales, profitability or near profitability Discount rates of 20-35%

Paraphrased from Trading and Valuing Internet & High Tech Stocks, Tom Gats, Financial World Publishing, 2002

The market is probably evaluating xG on a seed stage discount rate, whereas it now has the characteristics of a later stage company. If we are correct on profitability, this lowered risk will feed into a sharply higher share price in the short to medium term (3 - 6 months), though could do so in the very short term.

Risks pertain mainly to further delays with the phones or modems, as the BTS are now clearly marketable. We believe that fixation on these risks would be short - sighted, as the implication of the base station sales and partner/territory announcements is that xG indeed has a highly commercially valuable technology. If so, possible further delays to roll out of VoIP and Broadband (which we have no reason to expect, save for Murphy) should not detract from the fact that the company now seems to present the genuine disruptive threat that, going by the experience had experience of Western Union so long ago, is usually initially missed by observers and is not even particularly behind schedule.

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****IMPORTANT DISCLOSURE CONCERNING INTEREST IN COMPANY****

Robyn Harte-Bunting, Head of Technology Research at Hichens, Harrison & Co. plc
and the author of this report,
holds shares in xG. He acquired his shares in March 2005.

Risk Factors

xG is an early stage company which has developed a communications technology which is only just now on the cusp of commercial acceptance. We would like readers to be lucidly aware of the following considerations-these are primarily intended for retail investors, though we think that most investors are not aware of the content of the first point.

1. Successful technology development and commercialisation, such as xG is attempting, cannot be understood on the normal or bell curve model of risk. (Actually, neither can stock market investment in general-see Benoit Mandelbrot, "The Misbehaviour of Markets", Profile Books, 2004) Diversification is only a very weak protection against the volatility of returns inherent in investment in such ventures and standard deviation is of no use in measuring risk. There is in fact, properly speaking, no average return and the variance is infinite. Hence if a Venture Capitalist invests in 100 companies and makes a return of 40%, one cannot infer that the average return of each portfolio constituent to the portfolio is 0.4% in any meaningful sense-in fact it is likely that the great majority of the portfolio companies will have done very substantially worse than 0.4% with a very few outliers, perhaps only one or two, providing the entire profit. The distribution is heavily skewed and is called non-standard or non-Levy. An example was the film industry in 2001. Out of 400 Hollywood movies produced that year, 4 made all of the profit. (source-Arthur Devany -"Hollywood Economics", Routledge, 2004. The subtitle is instructive-"How Extreme Uncertainty Shapes the Film Industry."-our italics and underlining). Exposure to such companies must therefore always carry the assumption of the possibility and likelihood of heavy losses as the mode (most common occurrence). Another way of looking at this is via the mathematics of expected value-the chance of picking one of the winners which produce all the value is very small-at the seed capital stage much less than 1%. That said, we think xG is well past this stage and enjoys substantially better odds than 1% of producing an outstanding return.
2. We have written this note because we think there is evidence to suggest that xG has reached profitability, or at least positive free cash flow, unexpectedly early. Our argument is inferential and speculative. We might be wrong.
3. If we are right on profitability/cash flow, we could be mistaken that xG can sustain profitability and therefore establish a run rate upon which our valuation argument is premised.
4. If we are right about profitability and run rate, xG may nevertheless suffer further delays in development/delivery of commercial equipment such as phones and modems. The market has already marked down the shares in xG, we think, precisely for this reason. Further delays could cause further falls in the share price.
5. We think a strong industrial/commercial partnership is extremely desirable for the company-there is no guarantee such can be created.
6. We are not electronic engineers and do not have a background in communications science, though we have sought and noted the opinion of such.
7. We think that the development and protection of xG's IP is unusually and extremely dependent upon the abilities of the senior management team. We think they are brilliant at this, but we also think they have to be.
8. We are extremely bullish on xG's prospects and think the main risk is being out and wrong, rather than being in and wrong. This is especially so for existing investors in the space-we have previously argued for xG's "hedging" or "option" value to those already exposed to communications stocks.. Nevertheless, readers should be aware that the price of being in and wrong could be 100% loss of exposure. Position sizing should be calculated on the basis of an unsuccessful outcome costing a 100% loss.

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