Telzed

Notes on Vodafone and its relevance to the wider global telecom industry

Analysis of Vodafone's own reports

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Author: R Steele

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This is not an investor's analysis. It is not a comprehensive review. The report identifies a number of key numbers and puts them into a wider context that helps to assess Vodafone, its future prospects and broader market trends. It helps readers to identify issues in other markets. It assists investors, regulators, industry leaders and governments.

This paper includes some comments and opinions that are designed to provoke additional thought and discussion

Telzed Limited UK. Consulting, Advisory and Interim Management Services
All correspondence: Lilac Cottage, Westerfield Road, Westerfield, Ipswich, IP6 9AJ, UK. Tel: +44 (0) 777 178 7607
Registered Office: Orchard House Park Lane, Reigate, RH3 8JX, UK

Table of contents

Document history

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1 Vodafone's performance and strategy are useful for assessing the wider industry

1.1 Background

Telecom operators' performance is shown in their Annual Report and quarterly updates. Some also issue trading updates and other papers that show results and business activities. These provide data on past and recent business activity. With some additional analysis and wider understanding of the national/global markets and trends, this can assist with a deeper understanding of the situations that telecom operators are facing.

Understanding, and decision making, are complicated by the rapid and ever-changing telecoms market – new technology and huge traffic growth have been taking place. The impact of the Covid virus over the last year and its impact on the future add further uncertainly. The virus has changed both business and consumer behaviours, giving more home working with increased remote teleworking that should increase traffic in some areas (but reduce it in others). More at home time increases Internet usage such as shopping, education and entertainment (especially video) that increases broadband traffic.

5G has been introduced in many countries in the last year+. This adds further capital investment, on top of 4G investments that are needed anyway to cope with large traffic growth. Strategic understanding and decisions are further burdened by a wide range of claims and reports on the future for telecoms and the impact of Covid and the new ways of working. Some of these can be dismissed (Covid and virus) but other reports may seem plausible or make major claims, yet they might be unrealistic.

It is important that business leaders have a detailed understanding of the markets and trends. These are essential inputs the major questions on how much to invest and what technologies to target. This is driven by the strategic needs and choices taken – managers need to revise these to define the questions that need answering in order to make these decisions. Deeper understanding assists with the identification of what the key risks and questions are, and so helps ensure better decisions.

This report gives reasoned answers to why Vodafone's numbers are what they are and the implications for its strategy – issues that are relevant beyond its business domain.

This report provides a summary analysis of Vodafone's situation. It is not a definitive assessment of Vodafone or of telecom markets in general. Comprehensive analysis requires more extensive work. This report "only" indicates potential areas for further investigations, but it gives additional insights that help define the issues to address and to define the possible directions. This has wider application – the Vodafone understanding helps in other markets and assists other operators. This follows from the fact that Vodafone is a leading player in fixed and mobile in many countries. Further, understanding of any one market or operator really needs comprehension of similarities and differences to another.

1.2 Messages from this report

This report provides an analysis of the Vodafone data, along with other insights and data. This gives understanding of the implications of the numbers – this paper looks at what these mean. The "simple" listing of highlight-numbers is minimised. These are in the source documents. So this report includes similar thinking to that in past Telzed reports on UK telecoms market data. These reports provided insights to the number's *implications* that are relevant to many countries. Similarly, understanding of Vodafone and its national markets also provides useful understandings for other situations.

Key points from this report include:

- Covid caused some mobile revenue reductions but these seem to be now small compared to pre-Covid
- General mobile revenue trends are mostly static or slightly falling. This trend pre-dates Covid
- Although large reductions from Covid were avoided, no Covid bonus is seen. So at-home working etc. is not greatly expanding Vodafone's business (likely also true for other major telcos)
- The traffic per mobile user continues to rise – 30-50% per year per device. This is seen elsewhere and also happens in fixed lines and forces more capex in mobile networks (x10 more capacity every c8 years)
- 5G based revenues are elusive despite significant investment over c18months. At best it may have helped to stop mobile financials being worse
- Competition is reducing mobile prices (shown in static or falling ARPU). This is giving little or no mobile revenue increases. This has major implications for mobile markets as penetration levels are typically close to saturation and so capex has to be bounded – there is little upside revenue to pay for large capex increases (Vodafone is limiting its capex to a roughly consistent level)
- **The revenue upside is from fixed broadband.** Vodafone is expanding here and investing for longer-term growth. A focus on using its own infrastructure (fibre and cable) is noted as a preference to wholesale resale of incumbents' services. This fits with a longer term strategy
- **Investment in 5G seems to be for capacity increases and to reduce costs** per Gbyte. As yet, a significant upside from 5G-based services and revenues is *not* seen. NB customers and traffic are increasingly moving to be on 5G but more-data-on-5G is not considered here as a "5G service." It is simply more data, continuing trends seen in last ~20 years
- Business-moves into value-add, content and applications that may run over broadband access, Internet or 5G, are notably absent or, at most, limited. Vodafone is mainly focussed on being a telco, in the traditional sense. Telzed suggests this is a sensible/conservative approach as monies from AI, cloud computing etc. and from the

huge benefits from *using* the Internet (over any medium, including 5G) are elusive. These are not *telco services* (in the traditional sense) and to take on the myriad of new venture start-ups[1] or Internet giants or content kings would be risking disaster. Vodafone has a relatively conservative (and sensible) strategy. Vodafone is likely active in the telco end of the new service structures including private 4G/5G, Open RAN etc. The latter is likely a service or technology bought-in to supplement its network rather than a business to sell (it is only mentioned once in the Annual report). Neither is likely to transform the business finances

- Vodafone's performance is not strong but it seems that steady upsides are possible in the medium to longer term. These should be seen in fixed line growth from the recent Vodafone investments. Vodafone's revenue is not likely to fall much faster than it already has – telecoms is a stable industry and consumer needs are steady, as shown by the Covid outcomes
- ***Major* 5G service upsides are not likely.** Vodafone seems to acknowledge that. It is also reflected in the share price. Short term revenue and profit gains are unlikely (price-pressures, competition, traffic demands, capex needs and a lack of 5G revenues *for the telco*). The investments fit with a long-term telco plan [contrast: alt nets that mainly rely on resale of bought-in wholesale services].

[1] Yes, a telco can be a start-up venture but the risk of failure is huge. It is all too easy to forget the 1000s of on-line companies that fail. This is part of free markets. A telco normally cannot make many such ventures in the hope that maybe the one in ten is a run-away success. Investors would be asking serious questions if such a move occurs

2 Vodafone analysis

2.1 Key sources

In this report is based on:

- A February 2021 trading update[2]
- Vodafone annual report 2020[3]
- Detailed quarterly reports[4]. This has extensive numerical data to end of 2020
- Telzed experience and insights, some of which are in Telzed papers such as in the UK Market reports.

2.2 The Covid virus is a key background

Numbers and inferences must be considered in the context of the virus. This has changed the global markets – more so in some countries but less in others. So all messages and decisions must factor this into account. Covid seems to be a longer term global issue so impacts will be huge in 2021 and likely also in 2022 and even beyond. If telecom markets continue to reflect the altered ways of working that have occurred in 2020, then the reported numbers are a strong basis for predicting the future. Else, a new post-Covid customer demand may occur.

Readers must make their own assessments for the longer the impacts of Covid and how they affect the markets. This includes variances by country. This report proposes:

- Covid changes in the traffic profiles and ways of working/learning/shopping/using-Internet will continue. This means that 2020 and early 2021 data *is* a valid basis for longer term assessments. Here, longer term means out to end of 2023. Experience shows that telecoms is a fast-changing industry so much longer-term predictions are often proven wrong
- Many countries are currently implementing vaccine programmes. This could re-set economies later in 2021. This is considered unlikely and even in the event that "the virus *is* suppressed," many current-ways will continue. Telcos are relatively immune [*sic*] to the virus as the service is essential for most customers, so any upside changes will be small. This is evidenced by the lack of major Covid-downsides

[2] Vodafone Group Plc : Q3 FY21 trading update

[3] https://www.vodafone.com/content/dam/vodcom/files/vdf_files_2020/pdfs/vodafone-annual-report-2020.pdfAnnual%20Report%202020

[4] https://investors.vodafone.com/reports-information/results-reports-presentations Note that this has details not seen in the trading update (e.g. the update refers to quarterly growth but the numbers show a revenue reduction over one year). See Q3 spreadsheet

- A key debate is whether Covid has increased or decreased telecoms usage due to the altered lifestyles. Arguably it should have boosted usage in most markets and hence increased revenue potential. Some areas such as corporate office and some business usage of telecoms has likely fallen

- The impact of domestic and home workers versus office and corporate usage depends on a telco's business focus. Some are strongly corporate end-user focussed or else focussed on wholesale services to other telcos. Vodafone covers corporate and domestic customers. This complicates the analysis but it is likely that most major-name telcos like Vodafone will be dominated by the much larger number of domestic mobile and fixed line numbers, so corporate-customer impacts from Covid are masked by the larger domestic/consumer behaviour-changes. Telcos that have major fixed line businesses [especially the incumbents – BT, FT, DT etc.] will likely be more corporate focussed (leased lines, call centres, managed network services, IT systems hosting etc.) and so could see greater losses as such networking is cut back with home working. But even this may be partly compensated for by larger central site internet access demands (more traffic to key hosting and support sites)

- Vodafone is not an incumbent fixed operator. It is a major fixed *and* mobile player, so Covid impacts should be less than, say, BT. Vodafone's fixed line business is dominated by domestic customers, so their behaviour is critical to the future.

2.3 Vodafone headline points

Some numbers and points are worth noting here. This gives context and general understanding of Vodafone. This is within the Vodafone material but is included here to make this Telzed report more comprehensible on a stand-alone basis. Readers should look at Vodafone more closely for a fuller understanding. The published information provides a lot of data and this can give useful insights to markets in any one country and to how traffic and customer numbers are changing. The detailed analysis to be carried out depends on the focus area and the business insights required. In this report, we focus mainly on higher level aggregate numbers and broader trends in major markets, not on detailed changes withing say Egypt or Turkey.

Vodafone is both a fixed and a mobile business. Although best known to many as a mobile leader, the fixed line business is significant in many countries, especially Germany, where there is also a major cable TV business. Vodafone has nearly 900k UK fixed broadband customers. It is not a "mobile" business.

Fixed line services are mainly broadband but voice is significant and, in some countries, TV also.

There is presence in Germany, Italy, UK, Spain, Portugal, Romania, Greece, South Africa, Turkey and Egypt, plus some others. This means an overview of the company gives a broad international view of telecoms trends.

Key numbers and trends include the following. Some are commented upon further in the later analysis:

- Group wide mobile revenue was roughly steady or slightly falling before 2021 but fell more in the Covid period to date. A recovery per quarter is seen (some growth back towards pre-Covid numbers)

- Overall revenues have not increased since 2017. Some increase in the 2020 annual report (mainly covers 2019 and 2020) was seen group-wide but this declined again slightly over recent quarter numbers. This constant or slightly declining telecom revenue has been reported on in other data sources - Ofcom market reports have shown similar results[5]
- Group wide fixed revenue rose steadily and mostly compensated for the mobile revenue reductions but aggregate totals (Fixed+Mobile) still show a reduction from pre-Covid values
- The same group wide revenue trends are also seen in the Europe totals
- Germany revenues showed overall growth in last two years as the fixed line business increases. Despite mobile customer number increases of 4%, mobile revenues were small or roughly-steady. Germany is the largest single business country-segment
- Italy showed a 16% decline of mobile revenues over nearly 3 years (more than the 13% decline in customer numbers) and the fixed line increases could not compensate fully (net 10% reduction). Fixed line services is now 38% of the business
- UK showed a 5% mobile revenue reduction but customer numbers were close to steady, but fixed line increases resulted in just 1% revenue reduction over nearly three years. Mobile revenues are now steady after the early Covid fall of 8%
- Spain showed c12% revenue reductions in mobile and similar in fixed (14%) over nearly three years. Revenues seem stable in recent quarters. Mobile customer numbers declined 5% in just over 2 years, which is less than the revenue changes of 7% in that time
- All countries showed fixed line customer increases. UK and Germany showing 67% and 60% increases respectively but these fell to 28% and 2% in the last year
- Mobile data usage per customer shows the type of customer served (low or high user or maybe even quasi-fixed line FWA type user) and how the markets are developing
- Almost all countries show mobile data growth of nearly 40% per annum or more:
    - UK data growth is less per customer - 22% - in last year, though 33% pa over the last two years.
    - 56%, 57% and 81% data per customer growth is seen in the last year in Portugal, Italy and Romania.
    - Such data usage changes are seen globally (See Tefficient data and Telzed papers)
- Mobile data usage is:
    - Germany 3.5Gbyte/month

[5] See also the Telzed analysis of the implications of the UK market data, again this includes messages relevant to other countries: "Review of Ofcom's Communication Market Review 2019"

- Italy 11.4 Gbyte/month
- UK 4.9 Gbyte/month
- Spain 8.3 Gbyte/month
- Portugal 20.9 Gbyte/month
- Romania 2.4 Gbyte/month.

The reports have some bias to "bigging" up the numbers, which is understandable. For example, the Quarterly update notes:

- Rising contract mobile customer numbers. But falling pre-paid numbers usually more than compensates. Of course contract customers are usually preferred so the trend to contracts is positive
- Gbit/s *capable* fixed lines rose from 25million to 41million in a year. But actual Gbit/s type services are not reported. This is a wider issue as for example Ofcom *et al* report numbers of premises capable of ordering Gbit/s services or fibre services (homes passed). This is much higher than actual take up. This matter needs wider discussion as passing a home is very different from connecting a home. Deeper questions relate to why customers do not take a fibre or Gbit/s-type service but remain on slower speeds such as from xDSL or fibre to cabinet and so have c50Mbit/s or much less. This will become a discussion issue in the next few years (unconnected to Vodafone, but it will impact Vodafone's future customer take up)
- Business fixed line revenue increases were 5.2% up to 2021 up from 4.4% the previous year but the total is not shown. The total of *all* business revenue declined 3% (see p10 of quarterly update). The sub-market's positive result is highlighted.

2.4 Implications of some key numbers and trends

This section gives a view of the implications of the numbers above and in the sources. A degree of subjectivity and opinion is used as the interpretation moves away from noting the values themselves. These views are considered to be reasonable deductions. The messages are of wider interest than just to understand Vodafone and its markets. The messages are likely relevant to many countries and to other operators: the same problems as Vodafone and its national markets are surely seen by others in the same locations and to varying degrees are also seen globally.

We can deduce the following.

Telecoms generally remains a roughly constant revenue market. Some emerging markets (not Vodafone's focus) could be rising.

There is no sign that mobile is an increasing market. It is constant or even declining in revenue. Customer growth is small and may be countered by falling ARPU. Therefore there is no "switch to mobile" either in customer behaviour or in customer numbers or in revenue. Of course, small exceptions to this may exist, but Vodafone is surely a representative of broader trends. This is counter to some commonly held beliefs. In other Telzed work part of this can be ascribed to the fact that mobile devices/networks are used to access many more sites per Gbyte downloaded, but fixed line Gbyte usage is vastly larger, hence mobile seems more relevant. Customer value is perceived to be from the many sites & services. Network costs are driven by #Gbyte not by site numbers.

Covid has not increased revenue in telecoms generally even if traffic increases have occurred or traffic has moved from business to domestic customers. Covid caused a decline, though this has partly recovered since Q1 2020.

Lack of revenue growth may just reflect Vodafone's poor performance, and other telcos are doing much better. This is possible but share prices of BT and Telefonica also show declines – that implies a general negative view of telecoms. Vodafone results do not give evidence for upward movements as roughly constant revenues and constant high capex to cope with that traffic growth are not positive results. Growth is worsened by inflation effects (not factored into any numbers). McKinsey data[6] suggests that European operators need ~1% CAGR in revenue to cover 5G capex. Even this low (Telzed view) value is not met.

The mobile data usage rises in line with other countries (see Tefficient data for example). Fixed line traffic usage growth is likely to be similar (reported elsewhere, not in Vodafone data). The #Gbyte per month are typical of developed country's mobile device values (4 - 10Gbyte/month). This is hugely behind fixed line usage that is 100s of Gbyte per month, so traffic is not "moving from fixed line to mobile." Again, this is counter to some beliefs. Certainly mobile traffic growth rates can be higher than fixed, but as fixed line traffic has typically 90% of a country's national Internet traffic this is not a sign of fixed line services being replaced. 50% growth of 10% of a market (mobile) is less than 30% growth of the 90% share carried by fixed.

The mobile traffic growth means network capacity has to increase 10x every 6-8 years. This forces major capex to increase a masts capacity and to add new masts. In effect capex is a constant quasi-opex. The fact that new equipment (e.g. 5G or transmission/fibres) has more capacity over time for a similar price, has enabled telcos to carry this traffic demand. This fact has been true for c30 years – it is technology advances such as in transmission & fibres, sub-sea cables, 3G to 4G etc. that provided the huge capacity increases without hugely higher consumer expenses per month. The same trend is now true of 5G, as indicated by Vodafone's use of 5G.

Fixed line broadband numbers increased in almost all countries. Vodafone is a "new entrant" in the fixed line arena and not the fixed incumbent, so rises are expected. The numbers do not suggest any movement away from fixed lines overall. It is unlikely other telcos numbers are falling more than Vodafone's gain. Other sources show fixed broadband customer numbers rising in most markets. Mobile is not substituting for fixed – the Vodafone evidence shows that the mobile usage, even though rising, is not substituting in any significant way for fixed traffic. It is far too small and the increase simply aligns with the known need to cope with normal mobile traffic growth, not from fixed-line type usage moving on to mobile devices. Even in the latest 2020 data, gaining fixed line type services on mobile, is not shown. "The future is mobile and 5G" type claims are not borne out in the Vodafone trends. Furthermore, clearly Vodafone does not believe in fixed substitution - hence its large investment and growth of the fixed line businesses. It sees fixed broadband and as a long-term business and one that can grow, at least for Vodafone, in contrast to mobile markets that are roughly static (with maybe some small increases in some countries) or are in slight revenue decline. The Vodafone strategy fits with other Telzed analysis – the future needs fixed (fibre-based)

[6] https://ferrycgrijpink.substack.com/p/connectivity-providers-in-most-markets?r=2s0n3&utm_campaign=post&utm_medium=web&utm_source=linkedin

broadband for the majority of traffic and mobile fills in for some situations especially where mobility is relevant. Mobile *cannot realistically* carry the majority advanced Internet-countries traffic. Does anyone still think Vodafone is totally wrong (along with BT and most major telcos)?

Vodafone sees 5G as a medium term business: "*The roll-out of 5G services, which began last year* [2019], *also represents an opportunity for operators to significantly* ***reduce the cost of carrying data on their network****. 5G will provide a range of new revenue opportunities over the medium term by enabling operators to offer innovative new products and services to customers*" [2020 Annual Report, emphasis added]. The figures even for the end of 2020 do not show 5G-based growth leading upward revenues. This means that any new products or new 5G revenue is currently small enough to be not significant – hence it is not highlighted by Vodafone [surely it would have flagged the new Xmillion of new 5G custom?]. At best a 5G revenue boost is masked by the Covid decline, so: "it could have been far worse without 5G," remains a possible claim. There is no firm evidence of this in the figures. Arguably the real benefit is in *reducing costs* – 5G masts (ideally as an add on to the existing physical ones) can provide larger capacity and so carry the ever-increasing data traffic. This benefit is stated by Vodafone. Other sources imply the same – 5G is primarily the way to expand the network where capacity increases are mostly needed. This is logical.

The stated use of 5G to expand a network capacity to carry more data without any highlights of major new revenues is significant. Even by end of 2020 (c18months after 5G introduction in over 100 cities) there is no claim of major 5G revenue or new services. This seems to show it simply carries more data. Certainly, Internet of Things (IoT) is mentioned but such revenues are not shown nor are there private-network 4G/5G revenues[7] shown. These may exist but in reports that try to "big up" a company image this omission is surely significant.

There has probably been some 5G revenue from additional fees to get on a 5G price plan (in addition to 2/3/4G network access). But in many operators/countries surely these price plans are now inclusive - there is little or no 5G premium. This is logical as, for most customers, the use of 5G is the same as for any mobile device – it is to carry data. A 5G specific service and revenue is elusive. This is emphasised by other sources[8] that have shown how 5G devices certainly increase data-volume usage per month (expected due to video usage that is encouraged by the screen quality) but the data-volume increase on the same device is much larger over the fixed line (WiFi). So 5G stimulated the fixed line volumes. Such facts are logical but slightly counter to some expectations and the "5G hype."

Vodafone notes the possible opportunity to "*upsell through our speed-tiered unlimited data offers and 5G.*" 2020 Annual report. This may exist but the revenue gains are small enough to be masked by other trends. This is not promising for any anticipated 5G saviour for mobile network operators in the near future. Surely such effects would have been seen by the end of 2020 and would have been trumpeted by Vodafone in countries where this was happening. Speed tiers can be easily competed down. Unlimited data has obvious dangers and locks in constant revenue with rising traffic.

[7] Creating networks and systems for or jointly with corporations say to cover a major manufacturing plant rather than the company using WiFi, private networks and public mobile services

[8] See Ofcom and EU data. See Telzed web site and its report on 2019 UK market data

The data volume increases per mobile customer and the volumes used per month are in line with other sources. Large growth per year is normal. It does vary by country (amount used and growth rate). UK mobile data levels are relatively low (4.6Gbyte/month) and growth rate is quite low. This makes UK and Germany fairly similar markets – the low mobile data usage emphasises that fixed lines carry the vast majority of all traffic (>96% in the UK). Some other countries have c14% over mobile (Ireland and Italy)[9]. The Italian high mobile % of the market compared to the UK is due to

- Higher Italian mobile usage and low UK usage per device, and
- Low total usage of the Internet in Italy per capita (<40% of the UK usage). So even the relatively modest mobile usage in Italy (11.4Gbyte/month by Vodafone customers) is a higher percentage of the total.

This shows that a full understanding of a market (say Italy) needs additional information and a wider market comprehension. One can speculate that *some* mobile users in Italy are indeed using the device instead of a fixed line as the mobile usage per device is high compared to average mobile users in Italy. But if this use of mobile as the primary broadband method, *is* done then surely it is only done by a small percentage of customers.

Portugal also shows high Vodafone usage per customer – well above the average mobile user. This is a positive sign that premium users are being won by Vodafone. A wider concern for all telcos is the growing problem of mobile tariffs having less price increase with volumes. At the limit this leads to "all you can eat" fixed prices. Vodafone would then get no more revenues despite the high traffic levels. This price-pressure is likely a contributor to Vodafone's poor mobile results. It also indicates further pressures on all mobiles due to the traffic (and required capex growth) from such price plans - without any revenue increases.

The UK mobile data volumes per device are higher than UK average volumes. This is likely due to Vodafone having a higher percentage of business customers than some other mobile networks [Telzed past experience]. But the usage is still low by standards of global leaders [see Tefficient data].

The lack of revenue growth is emphasised by the mobile ARPU numbers. In major markets it is roughly constant or in slight decline. This is a serious issue given the rising traffic. It shows that 5G has at best little positive impact. It implies that competition effects are making the markets harder for Vodafone (and by implication for other players). This can be tolerable if costs can be reduced: there is not much sign of this, and total capital-related costs will possibly rise with 5G. So 5G might give reduced opex (debatable and not yet clear) but more likely it is simply used as the upgrade option to carry more traffic where current capacity is exceeded. There is little evidence (if any) for new 5G services and transformational changes (as suggested by some industry commentators).

Low Internet traffic per capita in say Italy or Portugal might mean that mobile devices can conceivably be the primary Internet access method for some customers[10]. This thought is

[9] Other Telzed analysis based on early 2020 Tefficient market data

[10] UK and Ireland are much larger users of Internet and to carry a fixed line's 300-500Gbyte per month over a few mobile devices is not realistic. But low usage countries might mean c100Gbyte per fixed-line premise. Although seemingly plausible over a few mobile (FWA) devices this is still not realistic as the traffic will be c10x more in ~8

encouraged by the high traffic levels per month per mobile customer. However Italy or Portugal, like most countries, will surely not have *significant* substitution of fixed – that is unlikely. After all, the fixed line traffic growth alone every 3-6months in many countries is enough to double the entire mobile capacity, were it to be carried on the mobile networks. Why else would Vodafone build its own new fixed network, if there was *any* potential to do it with mobile masts acting in a FWA mode?

Vodafone has shown roughly steady capital additions (capex) per year since 2017[11]. This is relevant as 5G is a major shift and Vodafone reported many cities being 5G equipped. The evidence shows that Vodafone has not changed its business to dramatically increase investment in 5G *in addition* – it remains part of a roughly constant total investment. Of course Covid may have dampened this but the annual report is from mid 2020 so it is unlikely that reduced capex would have happened before then. A conclusion is that Vodafone is not investing hugely in 5G compared to earlier years' investment in 4G. Furthermore, Vodafone's primary market growth is in fixed lines (mobile is fairly constant), so much of the capex will be in fixed. If 5G were clearly the primary near term business future, surely major 5G investments would be showing up. This fits with Vodafone using 5G for network expansion and for medium term benefits and not as the primary business platform for specific 5G services. Further, as revenue in mobile is constant or negative this does not fit with predicted needs to cover required 5G investment (footnote 6) that imply +1% is required. That growth is only seen in the fixed businesses. This means that mobile is not a business with major upsides – the revenues are at best constant and may not have the growth needed to cope with traffic increases and the related capex. Cost per Gbyte reductions become ever more critical. Large capex increases seem hard to justify.

Vodafone notes investment in its own fibre and in Gbit/s capable networks. Sometimes in partnership with others. This is contrasted to wholesale purchase of broadband access for resale by Vodafone. Resale is useful in the short term but is subject to quality and restrictions of the incumbent seller's services – often regulated. Vodafone is therefore building its own fixed access networks. This gives Vodafone a return on the access-fibre investment as well as returns on the retail and core network costs. Although increasing the capex, this is a longer-term approach with better margin potentials. Therefore Vodafone is aligned with some other major incumbents and with governments that promote fixed line Gbit/s broadband. They surely also know that fibre based fixed broadband access is the primary future to carry most of country's Internet access traffic with up to Gbit/s type speeds. Mobile serves a different market and carries typically 10% of national traffic. Both are needed in combination – which fits with Vodafone's directions.

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years and elementary traffic analysis shows that the total #Mbit/s would overload even 5G masts, if FWA were more than a niche. 5G cannot replace fixed. Vodafone knows this and it is behind the strategy

[11] Annual report 2020 cashflow measures p240 or update report

3 Conclusions: not good but not dreadful

This report summarises key facts and insights on Vodafone. These are linked to other data. It shows the wider implications of some key trends and numbers.

The lack of mobile revenue growth is a key factor. This implies cost reductions are needed if more profits are required. This is difficult when capacity is rising and new investment is needed to build out both the fixed broadband networks and to extend the mobile networks (the later will be significantly 5G based). These pressures can be linked to sale of towers as per the Cornerstone and Vantage Towers changes reported on by Vodafone. With financial pressures and a need to invest, alternative and possibly more-efficient use of capital is needed. Readers can speculate if long term value is greater if tower assets are maintained in house or not. This issue is surely faced by other operators. Tower (mast) sales and lease back is a common theme in the industry.

Although some roughly constant mobile revenues are seen, and there are clear fixed-line-caused revenue improvements, the overall results must be considered poor. No significant upside is reported on. This is reflected in the share price – a decline of c40% over three years. It seems that shareholders are not very optimistic that there are near term upsides.

Although Covid caused a major share price drop in early 2020, much was regained, so only c10% was lost in the year to date.

A good aspect is that revenues were not clearly hit badly by Covid after an initial drop – this is logical as the need for telecoms and broadband has probably increased. But, this demand for more fixed lines and for more mobile data is not translated into revenue and resulting value creation in the near term that would surely have been shown in the share price. This report suggests medium and longer term returns are possible but likely to be based on the *fixed* line investments.

Covid has shown how vital telecoms is to everyone, as evidenced by the rising volumes and almost everyone is familiar with Zoom and Internet shopping etc. But there is no real evidence of wider telecoms market growth. The only real growth is in fixed broadband. Mobile is clearly a static or even falling revenue market, subject to price competition/erosion, plus never ending capex to cope with traffic growth. Mobile and any likely-small FWA use of it are not growing the bottom line. The growth is in fixed access. This is a key focus for Vodafone. It should be a sustainable business long term as traffic demands (speed and volume) make fibre-based access essential[12].

An upside is that Vodafone seems to be sticking to traditional telecoms and cable TV. This differs from BT with its venture into TV content such as football. This is compounded by a recent BT announcement to “take on Apple”[13]. Although telecoms is clearly not doing very well the possibility of a telco in Europe doing better than silicon valley giants or former

[12] Cable TV broadband and fibre to close to customer also meet the same needs of >100Mbt/s and 1000Gbyte/month or more. This is NOT possible in mobile/FWA with high customer penetration levels. See also Telzed papers. The basic traffic rules and resulting outcomes cannot be avoided

[13] https://www.thisismoney.co.uk/money/markets/article-9256973/BT-boss-reveals-bold-plan-giants-like-Apple.html

empires of Rupert Murdoch and Richard Branson, is surely small. This is a major discussion point, but Vodafone seems less likely to take such major risks.

Primary messages from the Vodafone analysis are significant and need to be emphasised:

- There is no obvious source of new revenues other than adding fixed lines. This is counter the "future is mobile" thinking. Vodafone is surely expert in both areas (as are BT and Telefonica *et al*) yet they are Fixed *and* Mobile players, and are focussed on remaining so
- There is little mentioned by Vodafone about transformational changes and new business structures with 5G. It adds more data capacity which seems the main business and may reduce costs per Gbyte. It is proposed that:
    - Commentators define telco-chargeable services separate to "use cases"
    - There are myriads of Internet based applications. They all can have huge benefits. But even if they use 5G, the gap to be filled is an explanation of how the telco can get a revenue. Else why build additional 5G in rural areas for (say) Agricultural benefits?
    - Hype should be avoided. Is remote surgery really a serious matter for 5G? Remote healthcare is now a huge factor for many, but 5G is irrelevant. Remote healthcare should be transformation in the poorest economies but getting *any* Internet access is the need.
- It is worth emphasising the reality of mobile and 5G aspirations may be counter to some thoughts. Vodafone represents a reality of: a medium term 5G capacity expansion with some cost benefits
- The primary growth area is fixed line broadband
- **The harsh reality from Vodafone emphasises that vast benefits from 5G (and mobile) from say on-line health care, Zoom calls, IoT, on line shopping etc., have almost no impact on a telco[14]. The revenues and economic gains are not addressable by the telco operators**[15]. There seems a degree of unreality in some claims and papers. Certainly there are revenues there and the global Internet based economy is of course huge. That is simply not a telecom business.

Vodafone should be able to expand the broadband fixed access business.

5G and mobile expansions seem to provide limited value enhancement in the near term. But it should remain a solid business unless price erosions (price wars) are severe and the telcos "compete themselves out of business." This may give low consumer prices but will yet further

[14] Unless the telco moves into being an Internet on-line-services-provider, rather than "just" an ISP that provides access to the Internet. Vodafone and other telcos do this successfully. The likelihood of a telco out-doing Facebook, Netflix, Twitter, Zoom, Amazon etc is surely low. Some small content and app provision is certainly possible, but investors might prefer to target the specific ventures rather than the telcos

[15] There are options for this but likely to often need government intervention to move financial benefits from end user companies to a telco that supplies "just" the connectivity. This opens up a wider discussion – contact Telzed if needed

limit investment in network expansion. This has a wider message for all players including end users and governments/regulators: high (low) prices are good (bad).

The optimum approach depends on the aims and the desires for short or longer term benefits. Maybe near-term high prices would be better in the long term to get fibre investment and universal high speed/capacity. This needs a longer study to balance high/low prices with short/long term benefits. This cannot be solved just by the likes of Vodafone but it is (or should be) a factor in government and in operators' strategies. Studies of the real difficulties faced by the likes of Vodafone are vital – competition is clearly stopping any higher prices. 5G and fibre cannot be simply regulated into existence. Commercial businesses like Vodafone are clearly limited by the reality.

A next step is to look at government roles and alternative financing, if major additional investment is needed. Vodafone's ability is limited (as shown here), and other major players like BT also have their own financial problems. Why should telcos put more 5G masts in country areas or densify cities for little or no revenue gain? Why or how can they fibre up the low-density rural areas if the pay back periods are very long? A related issue is moving economic gains in on-line services to the lower network supply layers – maybe that cannot be solved. Vodafone *et al* strategies must assume that they only get the telco revenues.

Postscript: Vodafone and 5G in a wider context

This report identifies key results and numbers from the Vodafone data. Notably absent are major upsides or exciting new 5G revenues or even significant 5G services that look likely to be major contributors to the bottom line. This needs additional analysis.

Of course, Vodafone is totally aware of 5G and its potentials. The focus on core mobile service and on fixed broadband is both sensible but does not mean that other ventures are not being sought. For example:

- "*5G will give rise to new business models, which will become more clear after a period of commercial and technological innovation,"* said VIshal Dixit, director of strategy and wholesale at Vodafone U.K. "*To take a leading role in this evolution, operators need to gain experience in platforms and platform business models, add non-telco sector knowledge to their DNA, and hire people from diverse backgrounds to build a more diverse, future-focused talent base*[16]"
- The Annual report mentions cloud computing, AI, IoT Security services, robotic process automation etc. Note that this is in both the context of reducing Vodafone's cost and as what corporate customers need to do in *their own* broader "Digitalisation transformations"
- Use case analysis in a 2020 WEF report[17]. Like other papers[18], the future is bright and 5G is a key enabler.

What is much less clear is how Vodafone or any telco can make a telco chargeable service from this. Cost reduction and making a telco more efficient are normal and laudable but this is far from expanding into new services and increasing the telco revenue base. It is a response to harsh financial and competition pressures as evidenced in Vodafone figures and in other telco reports.

The WEF report notes huge global benefits. Enhanced mobile broadband or 5G (or other technology) based FWA *are* clearly telco services. These are currently used on 5G and Vodafone is a player[19]. But many other services are limited prospects for a telco. Certainly

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[16] "Making 5G pay - Monetizing the impending revolution in communications infrastructure" PWC https://www.strategyand.pwc.com/gx/en/insights/making-5g-pay.html#Download

[17] WEF " The Impact of 5G: Creating New Value across Industries and Society http://www3.weforum.org/docs/WEF_The_Impact_of_5G_Report.pdf this has extensive 5G discussions on economic gains

[18] This is a recent report on 5G. The potential economic gains are interesting, but the report (rightly) does not actually say a telco can get these monies. Benefits could exceed cost by 4x. Yet a telco only gets the cost and vanilla data service (with few exceptions). https://www.analysysmason.com/about-us/news/newsletter/5g-spectrum-investment-quarterly-jan2021/. 4x return on costs should have investors queuing up. Why are telcos like Vodafone under financial pressure, if this was realistically addressable?

[19] Of course FWA is not a major promotion, it can simply exist as a mobile price plan. The reasons for this are self evident. FWA cannot substitute for many fixed lines in developed countries (the primary Vodafone focus). See Telzed papers, Vodafone fixed strategy and elementary fundamentals of telecommunications traffic and economics

IoT devices will proliferate and telcos can sell the connectivity service, but this can default to "just a SIM" and low volume data that can be also done as vanilla data in an OTT[20] service. The ability to capture revenue by a telco is elusive. Vodafone reports 102million IoT SIMs in 2020, a payments service and security services are mentioned. Clearly Vodafone *is* venturing into downstream services, but this is also bounded and it is not trying for the larger benefits from downstream markets identified in some papers (Internet applications, possibly over 5G). Furthermore, many of the value benefits can be equally implemented over 4G or over some fixed line services and a WiFi add-on. The WEF report notes "$13.2 trillion" in value from 5G but "only" "$1.6trillion for Communications and Info." How much of this is telco revenue that is incremental and not just existing standard telco broadband? "Information" is not a telco service.

The vast amount of other 5G benefits are interesting. Many rely on high reliability (96% of use cases, in the WEF report). If this means more coverage, especially if the end service is mobile. Therefore the telcos are then expected to extend coverage to all areas and to give strong in-building signals. Huge mast numbers also surely follow. This provides the WEF's basis for the "*5G potential for economic and social value across industry sectors*." This is missing full (any?) clarity on why a telco should give this universal 5G coverage when the economic gains are beyond the telco domain.

Certainly there are advocates that the telco should move onto the downstream services. The Vodafone reports imply that it is not leaping into those markets. Clearly it is fully aware of the potentials. More realistically it sees the possibilities to revise its own cost base with technical advances. Making money from using telecom conveyance services is normal (a phone call or email can settle a million $ deal), a message from a broken-down car may be worth $100s to the owner. But it is just bits and bytes to the telco. How can "use-case" value be transferred?

A strategic and investor issue is diversification:

- With a myriad of options in the 5G value chain (or are these also just in the "normal" Internet value chain?), then: which should be targeted by the telco? This has to be focussed as dangers surely multiply the further the move from a core business
- Vodafone is (like the major telcos) a mass market provider. If the core mobile data and fixed line access services are not thriving, then diversification into content/information/security/health/education etc. are not going to substitute
- Almost all telcos have business-customer services and specific value-added streams. Normally these are less than the mass market. Vodafone's numbers show this as well. Huge new investment in networking a factory or region with high density masts must be a careful commercial decision. If such ideas were extended to be a national programme then the risks are of complete company failure. This contrasts with lower risks when just a small factory/local venture is made, that could be a shared investment with the end user businesses – which of course also means that the full economic benefits will not all to accrue to the telco.

A few concluding messages are worth emphasising:

[20] Over The Top. This uses data and internet access, which is so cheap it makes premium prices difficult if OTT can substitute

- The entire value chain of the Internet is not addressable by a telco
- End user economic gains are not easily transferrable to a telco – that likely needs radical changes such as government interventions
- Additional economic values from *using* 5G are mostly also not addressable. IoT, FWA and more mobile broadband are telco services, but are not a significant business enhancement. They exist and have not significantly altered Vodafone's or many other major telcos' P&L numbers
- Harsh commercial reality is in the Vodafone numbers. It is surely both expert in and a strong player in 5G. 5G has not had a major positive impact on revenue. Readers may speculate if this about to be changed. Vodafone's view (and the evidence supports this) seems to be that outcomes will be more modest
- Robust strategies for lists of new services that are billable by a telco are needed. Less "lists of use cases" would be a start
- A steady long term busines that invests in fixed line fibre, cable TV, broadband access, masts and mobile services is surely a reasonable investment. It may never do a "Tesla stock market jump" but you will be using these services and much of the same physical infrastructure in 30 years.

Telecoms now has little investor-glamour [see: share price and the numbers!]. Arguably it has become almost a utility, albeit as vital as water, roads etc. Is that a bad thing? The end user value-add from *using* utilities is unbounded. Can much of that value add be transferred to the telco or can telcos risk entering that market?

This paper does not doubt 5G benefits and future changes. Broadband and the Internet has transformed the world economy. 5G will add to that. New services and some transformations will happen. This paper is focussed on the reality of Vodafone and similar players. The business and finances seem unlikely to undergo such transformational change. Yet it might still "do all right," which is certainly not bad.

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