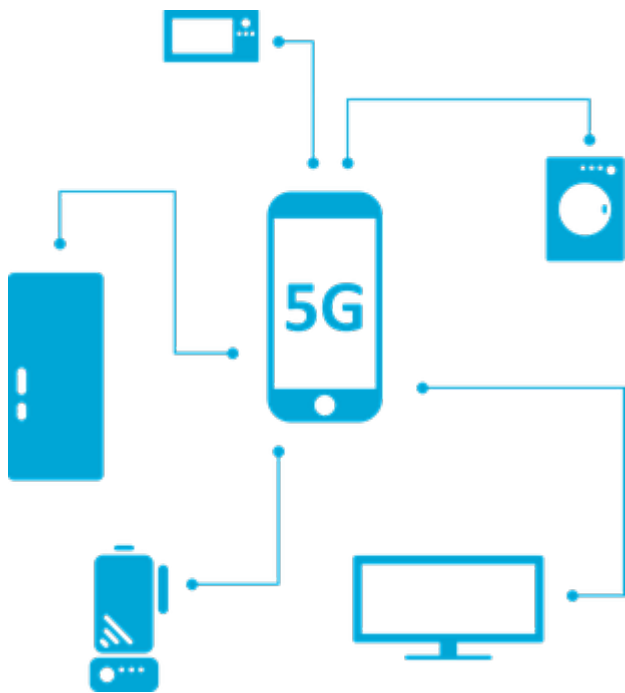# Progress with 5G Digital Coverage in the UK & Developing World Implications

Smartphone Technique

by David Fellows [1]

The 5G mobile communication offers the prospect of high bandwidth reception for rapid video downloads, gaming, instant replay coverage at major sporting events and simultaneous service to heavy concentrations of digital devices. It is a highly topical subject across the world including developing countries.

This article tempers expectations of widespread 5G coverage in developed countries on grounds of financial viability and suggests that developing countries are better served by

centring digital infrastructure investment on broadband cable and lower frequency 4G mobile services.

Digital Communication costs and coverage

I start by introducing a sense of realism about internet speeds and coverage by looking at actual practice in the UK which has reasonably average internet services for a developed country.

Table 1: UK internet speeds

User	Mobile	Fixed Line	Comments
Personal devices	4G (15/30 Mbps) 5G (2/100+Mbps)	Approx 30 Mbps (usually advertised as 50)	4G reaches 75% to 90% of the population depending on provider. 5G has hardly started(see discussion below). All-fibre cabling of 120 Mbps will become common in the next decade.

Small/ Medium businesses	—	100Mbps/ 1000Mbps	In this group call centres tend to need the higher capacity
Major businesses	—	1000Mbps+	

Note: 4G speed depends on provider and time of day [2], the better the infrastructure provision the better the service. 5G is said to relieve congestion although this too is infrastructure-dependent (see Table 3). For some time to come, even in developed countries, 4G will outstrip 5G coverage by some considerable margin.

In 2016 Universities of Cambridge & Madrid undertook a study [3] into the viability of introducing 5G mobile communication in the UK. Tables 2 & 3 summarise some conclusions from the study.

Table 2: UK Demographic Profile (total population 63 million)

Settlement Type	Proportion of Population (%)	Approximate Distribution of Total 5G Cost (%)
Urban	8	2
Suburban	62	19
Rural	30	79

Notes: (i) total cost adds capex & opex (see Table 3 below); (ii) the study anticipates that the roll out of 5G will take

place over the next decade.

Table 3: 5G Options for UK (selected from UC&M study)

Aspect	Option S2 £bn	Option S5 £bn	Option S8 £bn
Features	One 50Mbps network sharedby 4 operators	Using competitive 50Mbps networks except for ruralareas where a shared 50Mbps rural network applies	Using two 50Mbps networks shared by 4 operators except for rural areas where a shared 10Mbps network applies
Capital Cost	22	24	15
Revenue Cost (10 yr NPV)	13	17	10

Study Conclusion	Not viable; Scotland is dramatically more expensiveexcept for S8	Not viable; Scotland is dramatically more expensiveexcept for S8	Not viable; the lower rural bandwidth avoids the cost rising exponentially to cover the final 10% of population

Notes: (i) M**ost 5G signals are highly directional, require a direct line-of-sight between the antenna and the device receiving the signal and can be absorbed by humidity, rain, and physical object including trees, therefore they don't travel as far as the more robust, omnidirectional 4G signals (as a result they require very high aerial density and present problems for some applications under discussion such as driverless vehicles)** [4]; (ii) 5G networks can make use of existing 4G aerial stock and cable support but the higher aerial density makes the transition from 4G very expensive; (iii) the cost of covering the most expensive 10% of population at 50Mbps is equivalent to that for the first 90%; (iv) the study assessed the total cost (capex & opex for 10years) of 5G coverage for the UK's rail and motorway networks would be £0.922bn & £0.253bn respectively.

Part way through 2019 several UK mobile service providers have commenced or announced their intention to provide 5G coverage. Some have published city roll-out programmes although details of schedules, geographical boundaries and bandwidth are sketchy at present. None of this equates to a city-wide coverage commitment let alone national coverage.

Unsurprisingly the focus appears to be areas of potential high traffic where improved service reliability will be the driving advantage. Available bandwidth could be as low as 2Mbps for entry level packages.

5G services may be offered for pop concerts, major sporting events, shopping malls, some public buildings and crowded city centres. Some of the infrastructure could be provided by venue owners or organisers as Wi-Fi is at present.

The European Union produced a policy document '5G for Europe: An Action Plan' in September 2016 that seeks to drive progress towards realising substantial financial benefits from the technology. The Action Plan, quoted in a recent review of the Commission's achievements, seeks to harmonise European preparations giving priority to infrastructure coverage of major urban areas and transport routes by 2025.

Implications for Developing Countries

1. Given the financial viability challenges in developed countries such as the UK it is clear that rolling out 5G services in developing countries will be hampered to an even greater extent by the financial returns required to support infrastructure provision.
2. 4G coverage is indisputably more readily viable than 5G and is a more obvious objective for developing countries for the foreseeable future. Governments need to consider their bandwidth licencing programmes accordingly.
3. Conventional public Wi-Fi systems can offer mobile text communication to supplement overloading of 3G and 4G reception in public areas with high demand for digital

services.

4. In the author's opinion 4G mobile coverage and fibre-optic cabling of CBD areas for super high bandwidth communication offer the basis for viable digital communication strategies in developing countries.

General conclusions

1. At the present time commercial ambitions for 5G in the UK appear limited. The financial viability of the aerial installation costs on a large scale compared to 4G is a considerable constraint. For some time to come 5G may be largely confined to high income high demand locations and some venues where owners provide the necessary infrastructure as an added attraction. It is a solution waiting for a killer application or acceptance as a social status imperative. The current service and economic priority for mobile infrastructure must be the completion of 4G coverage. This reasoning would seem applicable throughout the world although it is reported [6] that Malaysia intends to adopt 5G fully by 2023. Malaysia is undoubtedly a leader in [digital technology](#) but this claim is something that requires clarification.

2. It is generally presumed that the long-term intention of 5G service providers is transmission speeds of 50+Mbps but at current revenue levels this form of coverage is deemed to be unviable in UK rural areas. The UC&M study suggests that shared rural networks operating at 10Mbps would reduce cost significantly and a broadly similar cost reduction could be achieved by omitting 10% of the population (equivalent to 33% of rural population) from 5G coverage. Even these two reduced service options would still appear unviable assuming current service revenues.

3. The UC&M study hints that technologies under development

may deliver significant cost savings for 5G provision although details of how this might happen are not well understood at present.

4. 5G viability in the UK and other developed countries would therefore seem to depend on some or all of: (i) restricted service provision targeting areas of high demand; (ii) technological advances bringing cost-savings; (iii) user willingness to pay higher fee rates for 5G than its predecessor services; and (iv) modest, possibly shared, bandwidth in rural areas.

5. Given these 5G service limitations, upgrading to 5G-enabled smartphones may be a nuanced decision for many users for some considerable time. Roll-out costs and user hesitancy will, in turn, impact commercial investment.

In My Opinion

1. Countries have much more to gain from improving the reach of 4G mobile communication than encouraging service provider interest in 5G roll-out which will be a niche offering for some years to come. Developing countries should not feel that they must jump now or miss the bus.

2. 5G mobile communication is not a natural alternative to fixed cable support for business purposes. In this market fibre optic broadband cable services offer the ideal of high bandwidth, service reliability and relatively low cost.

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[1] David Fellows is a specialist in public financial management and digital government reform and is a director of

PFMConnect. He is a recipient of the Swedish Prize for Democratic Digital Service Delivery.

[2] See: https://www.ispreview.co.uk/index.php/2019/02/countries-ranked-by-4g-download-speed-at-different-times-of-day.html

[3] See: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/577965/exploring_the_cost_coverage_and_rollout_implications_of_5G_in_britain_-_oughton_and_frias_report_for_the_nic.pdf

[4] See: Lifewire https://www.lifewire.com/5g-vs-4g-4156322

[5] See: https://5g.co.uk/news/ee-5g-launch-plans-roadmap/4900/

[6] See: OpenGov Asia (10th September 2019): https://www.opengovasia.com/malaysia-will-fully-adopt-5g-by-2023/

Using Digital Technology to Improve Sustainable Development Goal (SDG) Delivery
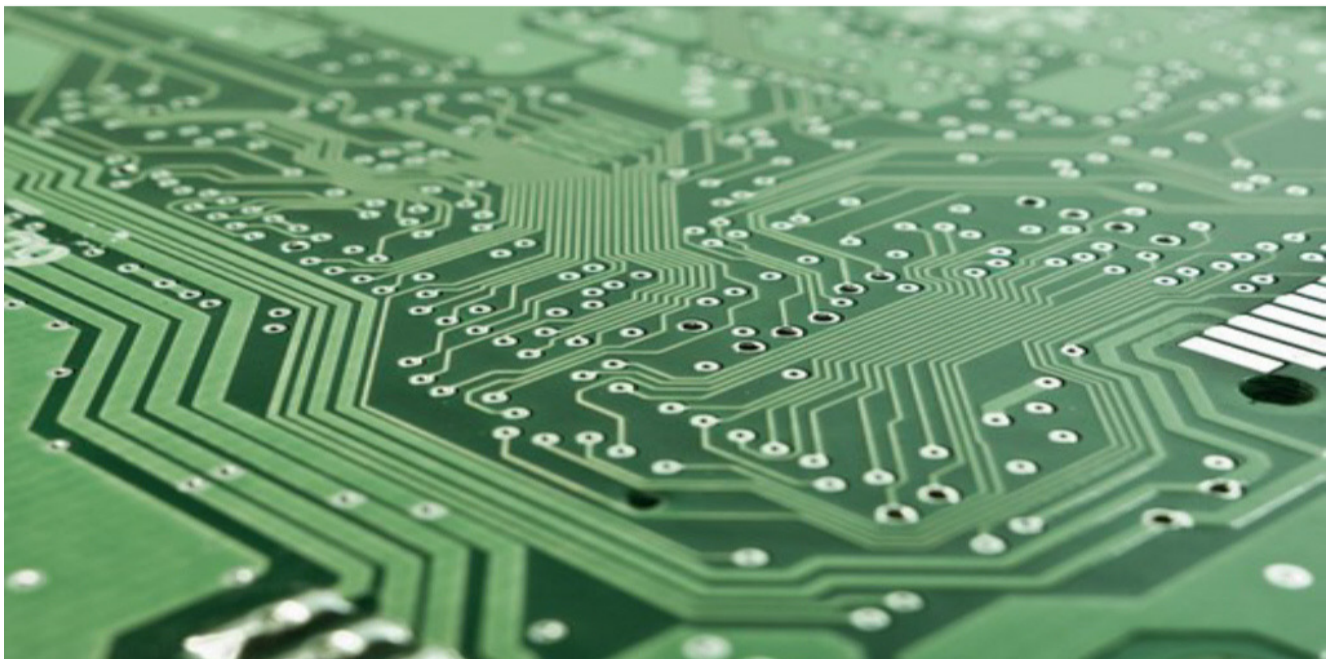
by David Fellows and Glyn Evans[1]

The SDGs

The United Nation's [SDGs](#) present an array of complex social, engineering, medical, scientific and managerial challenges for member states set in different contexts and mostly requiring very significant investment, organisational capacity and community involvement. Nations have made commitments to this agenda and it is accepted as guiding the key purposes of international development work worldwide. It is a hugely ambitious enterprise yet we suggest that current development work could be more successful.

The need for a powerful learning system

At a general level perhaps the greatest challenge is the creation of a learning system that is powerful enough to develop and distribute relevant knowledge and an understanding of how that knowledge can be best applied in the very different circumstances that exist across the world. As SDG performance criteria are finalised and adopted a [report by ESCAP](#) makes it clear just how difficult it is going to be to make a real difference.

We are not suggesting a great deal of organisation to create this necessary learning system. We propose a loose system of networking between experts based on digital communication. This would enable advice to be made available to community-based projects with greater levels of expertise being made available to the development of major programmes and projects. It would also facilitate feedback on project progress and performance. The use of digital technology would also improve the public information base and support public engagement.

Learning system features

The basis of this networking would be a digital communication system that would be largely self-driven by those in the field and a support network that will evolve around them. Key aspects of this digital communication system are illustrated below.

At national and local level:

- *Provide* feedback on progress made at
  local level within the country
- *Request the public to identify key factors to be taken into account*
  when designing SDG initiatives
- *Seek feedback on the regulations*
  required to support SDG initiatives
- *Engage in shared learning (perhaps amongst scattered populations) between ordinary people who are trying to cope*
  with SDG challenges on limited resources

At regional level:

- *Undertake shared research programmes*
- *Share experiences of adapting recognised approaches to particular circumstances*
- *Improve monitoring techniques*
- *Share monitoring and advisory services*
- *Encourage the development of problem-solving support networks*
- *Undertake peer reviews of projects and governance*

arrangements

At international level:

- *Build worldwide expertise to address fundamental scientific, engineering, economic, social and implimentation challenges*
- *Identify and promote successful strategies and initiatives*
- *Recognise issues for which effective solutions remain elusive*
- *Create networks capable of addressing significant and urgent challenges*
- *Develop modeling tools to help design solutions*

Supporting technology would include:

- *Websites including chat rooms, website messaging, on-line data monitoring and online questionnaires*
- *Video-conferencing for expert dialogue and advisory sessions*
- *Cloud-stored databases and shared document development*
- *Email for public interactions(newsletters), dispatch of documents, technical & administrative correspondence and technical update circulars*
- *Learning management systems to support training programmes that develop skills and expertise*
- *Application software to assist the gathering of performance data including the collection of data from administrative*

> *sources (ESCAP Report ibid:*
> *page x)*
>   - *Text messaging and social media for public dialogue*
>   - *Massive open online courses to raise general awareness*

In general such a system would require relatively unsophisticated technology dependent only on fairly low level digital communication. Expert dialogue would tend to benefit from good connectivity at reasonable bandwidth to support video conferencing although this is not absolutely essential. Proprietary software is readily available for most of these applications although bespoke monitoring, modelling and assessment tools could be created as the approach gained traction.

Examples from around the world

Our blog '[An International eCollaboration Route to Public Service Reform](#)'
(also published by the Australian National University's [DEVPOLICYBLOG](#) in July 2017) considers the diverse power of digital communication technologies. Examples of this technology used in ways relevant to this proposition are, as follows:

1. An example of 'Shared Learning' is set out in the UNESCO publication [Digital Services for Education in Africa](#). UNICEF has reported that in Vietnam 40% of children in rural areas used the internet for educational purposes, rising to 62% in urban areas.

2. Communities of practice have already been established in

[Canada](#) for green climate purposes

3. Social media has been used by PFMConnect for the past three years to raise public awareness on public financial management and governance topics reaching significant numbers of people in more than 50 countries.

Conclusion

This is not a system requiring heavy oversight and regulation. We seek cultural change to the way programmes and projects are developed. A more inclusive approach at expert and community level could be usefully supported by major development agencies and could become a requirement on contractors. For instance, these proposals could help the Green Climate Fund which appears to be heavily engaged in process issues at the expense of shared innovation.

Is it time to experiment with change?

End note

We should be pleased to discuss the ideas in this piece with those who believe that they may have relevance to their situation.

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[1] *David Fellows is a specialist in public financial management and digital government reform and is a director of*

PFMConnect. He is a recipient of the Swedish Prize for Democratic Digital Service Delivery. Glyn Evans is the Vice President of the Major Cities of Europe IT Users Group and former CIO of various major cities.

The case for an international online public service academy

by [David Fellows](#) [1]

Introduction

The purpose of this post is to consider how digital communication could be developed for the provision of structured professional education for public servants in developing countries using an academy model. This proposal is based on the proposition that there is a widespread need for professional training to improve administrative effectiveness through a general grounding in the nature of public administration and its place in society; the study of key aspects of public sector management, relevant techniques and organisational values; and the examination of reform objectives and the means of achieving them.

Why open learning for developing countries? Well, a campus format bears a heavy cost-base and brings the practical difficulties of assembling the teaching staff necessary to deliver the standard of professional education required. It also incurs the loss of students from the workplace for substantial periods of time, together with the costs of student travel and accommodation. The positive advantages of an open learning format include the flexibility of study time demands on student availability and, potentially, the benefits of an international experience for participating students given their interaction with students and teachers from around the world. This kind of initiative is not irrelevant to developed countries but I suggest that the priority and funding model should address the needs of developing nations first and foremost.

Geographical reach

The use of digital communication provides for flexibility of student and teacher location. Seminars and staff meetings could be held online, academic material developed collaboratively over document handling systems, and student work could be dealt with by email or in-house systems. This would not be far removed from how most higher educational institutions are developing staff/student communication even where they are campus-based.

There may be merit in some courses being directed to regional groupings of students in order to provide greater focus on regional issues and it would make sense to do this using tutors who are immersed in the regional context. There may even be merit in some courses being run on a purely national basis. It would certainly be important to ensure that student study programs are aligned to the needs of the employing governments, possibly reflected in the nature of assignments or course options.

There could be a single worldwide institution with regional coordination to foster government relationships and accommodate periodic student workshops, although this is not essential in order to gain advantages from this format. There could be regionally based institutions or some states could operate primarily on a national basis.

Student body

The students would be permanent officials of the public service in developing countries. There could be extensive flexibility about study arrangements including varying amounts of office time allowed for study purposes. This would be part of the arrangements to be agreed with the institution, and individual student study programs would take this into account.

Students could be encouraged to come together regularly online on a national or international basis to discuss their needs and course provision. Academic staff could join such meetings on request. Regular physical meetings of students could be possible on a national or departmental basis as well as at occasional regional workshops.

Prospectus

Initially the prospectus should be developed around core governance-related topics: policy development; management and leadership (including roles and responsibilities of politicians and officials); human resources (including capacity development, appointment processes, records); public financial management; law; ethics; and economics (as a more contextual subject). Student programs could identify specific elements to be taken at a more advanced level (e.g. taxation or international trade). Some elements could be country specific.

The student program-based approach should allow flexibility in

syllabus scheduling to reflect the time commitment made by each student. This does not mean that study would be unscheduled but that work schedules would be agreed with employers and students with the intention of building student cohorts around particular schedules. Tutors would be assigned to support each student cohort in making the necessary progress.

Courses would have action-oriented elements so that demonstrable benefits are gained for client governments from each program of study. Relevant benefits would be stated at the outset and evaluated in student assessments and satisfactory course completion would be formally certified.

In addition, short courses on service specialisations could be developed or a mentoring service could be provided for newly promoted administrators.

The foundations

There is no need to create a completely new institution. There are a variety of bases on which the proposals could be founded. Various universities, civil service colleges and development agencies (e.g. the [new online Public Financial Management Course](#) just launched by the International Monetary Fund) around the world could establish the kind of institution proposed as an adjunct to their existing courses and program. Doing so would also provide the governance and administrative arrangements on which to base the new institution.

There is also no need to make extravagant claims about the possible size and scope of the institution. It could perhaps take a modest group of nations and development partners as a starting point. It is interesting to note that three conventional universities in the UK offer online Masters of Business Administration (MBA), one of which offers a two year course, and the others are more flexible with UK citizens forming a minority of each student body (ranging from 11% to 48%). In addition, the [UK Open University Business](#)

[School](#) offers two and three year MBAs worldwide.

Nor is there any necessity to suppose that the starting point would be located in the northern hemisphere amongst the traditional developed nations. There would simply need to be familiarity with the concept of an open online college. Is the [Singapore Civil Service College](#) a prospective starting point? Could India launch an online Civil Service College to satisfy its own needs, while also attracting students from further afield?

Client state engagement in governance arrangements would also offer the opportunity of using the institution to further South–South collaboration and the greater ownership of development philosophy by the developing nations.

Funding the academy

The academy model is capable of being funded jointly by client governments and development partners. Cost-sharing could be flexible. Costs could be contained through collaboration agreements with appropriate institutions and the variety of expertise achieved in this way would add to the benefits of the model. The cost-benefits of online education have been demonstrated by existing institutions and must be exploited for this purpose.

The set-up cost would depend to some extent on the institutional foundations. Digital infrastructure costs would be scalable through agreement with application service providers with concessionary pricing being sought particularly at the outset.

Conclusions

The purpose of this brief note is to suggest that it is now possible to provide extensive and high quality professional training for the public servants of developing countries with courses delivered predominantly via digital technology. It is further suggested that such an initiative would be cost-

effective and possibly developed incrementally out of an existing institution(s).

At the current time capacity development has fallen out of favour with development partners due to the lack of clear linkage to measurable reform. I suggest, however, that without increased professional development for government officials the very ambition of improving state institutions is fundamentally flawed. It is for those engaged in the formation of new institutions to demonstrate the effectiveness of such initiatives through the delivery and assessment mechanisms that are embedded within them.

[1] The author is a Co-principal of PFMConnect. A slightly abbreviated version of this blog is available at the Devpolicy Blog of the Development Policy Centre based at the Australian National University's Crawford School of Public Policy.