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About the County

COMMUNICATIONS IN CUMBRIA : An overview

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The theme of this article is to record the developing means by which the residents of Cumbria could make contact with others outside their immediate community with increasing facility, speed and comfort.

The 20th century onwards with some overlap where inventions in the late 19thC did not really take off until the 20thC.

12. BUSES and TRAMS

After the railways had established that running on iron or steel rails was much more efficient, horse-drawn trams appeared. [124]

[Rail track was a major product of the Workington Iron & Steel Co. and can still be found all over the world.]

No street tramway appeared in Britain until 1860 when one was built in Birkenhead [125] There were still major problems with the amount of horse manure deposited in city streets as traffic increased. By 1880's electric traction had been proved and this was cleaner and cheaper than horses so trams became electrically powered. The world's first electric tram line operated in Sestroretsk near Saint Petersburg, Russia, invented and tested by Fyodor Pirotsky in 1880. [126]

The last recorded horse omnibus in London was a Tilling bus which last ran, between Peckham and Honor Oak Tavern, on 4 August 1914.[127]

In Cumbria only two towns ever installed tram systems [128]

Barrow: Steam-powered 11 July 1885 -13 July 1903 (4ft gauge)
   Electric 6 Feb 1904 – 5 April 1932 (standard gauge 4ft 8½in) power
   drawn from overhead cables

Carlisle: Electric 30 June 1900 - 21 November1931 3ft 6in gauge, power drawn
   from overhead cables. [129]

[After the First World War, the tram company was unable to expand the services to meet the needs of an expanding town, and had started its own motorbuses services. In 1926 it changed its name to Carlisle and District Transport Company.] [Carlisle's last surviving tram was moved in 2011 to Workington Transport Heritage Trust who planned to have the tram restored at an estimated cost of about £15,000.] [1210]

MODERN BUSES:

In 1885, German mechanical engineer, Karl Benz designed and built the world's first practical automobile to be powered by an internal-combustion engine.[1211]

and by World War I many 'lorries' and other large vehicles were in use in the conflict areas. So the flexibility that a 'bus' offered instead of a tram saw the tram systems replaced by buses, except in a small number of places where 'trolley buses' took over. T (Leeds and Bradford became the first cities to put trolleybuses into service in Great Britain on 20 June 1911)[1212]   However in the 21st century there has been a resurgence of interest in trams as being moreeffective than allowing cities to become choked with cars. Trams are in a period of growth, with about 800 tram systems operating around the world, 10 or so new systems being opened each year, and many being gradually extended.[1213]

The first bus using the newly-invented internal combustion engine was in 1895.[1214]

The first mass-produced bus model was the B-type double-decker bus, designed by Frank Searle and operated by the London General Omnibus Company – it entered service in 1910, and almost 3,000 had been built by the end of the decade. Hundreds saw military service on the Western Front during the First World War.[1215]

Workington Bus Station, the first covered bus station in Britain, was opened on 19th March 1926 for Cumberland Motor Services and came complete with a cafe, toilets and waiting room. The imposing red brick building was designed by Mr H Oldfield and featured a huge electric sign, golden at daytime and glowing red at night. Over the years the bus station was extended, and in 1992, after many years of neglect, the building was refurbished. It was officially re-opened on 22 June 1993. The building may have changed over the years but there are still plenty of departures each day. [1216]

There was no national system of regulation so that a large number of bus companies came into existence. Hearsay has it that there were as many as 30 companies in Carlisle in about 1930. These were eventually reduced to four main companies[1217] (by sheer economic attrition). They were nationalised into a single unit The National Bus Company (NBC) that operated in England and Wales between 1969 and 1988.[1218] NBC did not run buses itself, but was the owner of a number of regional subsidiary bus operating companies. Cumberland was one of the first National Bus Company subsidiaries to be privatised, bought by Stagecoach, Cumberland in 1987 and Ribble in 1988,

Typical Stagecoach bus on Penrith-Workington X4/5 route 2015

Stagecoach then split into two territories:*CMS Carlislebus* for services within Carlisle itself and *CMS Cumberland* for the rest of the services; eventually both territories merged with Ribble's south Cumbria services to become Stagecoach Cumberland. Stagecoach in Cumbria is a trading name of Stagecoach North West Ltd and operates services in 2019 around the Cumbria area (formerly known as Stagecoach Cumberland, Stagecoach Ribble and Barrow Borough Transport). [1219]

13. ELECTRICAL COMMUNICATIONS

A. THE TELEGRAPH

In the mid-1830s William Fothergill Cooke developed a telegraph that indicated letters by using the transmitted electrical current to deflect magnetized needles at the receiver. During the same period Charles Wheatstone conducted several important experiments on the long-distance transmission of electricity. In February 1837 the two men pooled their efforts and in June they obtained a patent for an electromagnetic telegraph using five wires to deflect five needles in order to indicate letters of the alphabet. They built their first commercial line in 1838 /1839. In late 1842 Cooke patented an improved telegraph that used two wires and needles, instead of five, to indicate letters; this halved construction and installation costs. During the early 1840s railways were the major customers of the telegraph.[131]

In 1846 Cooke and a group of investors founded the Electric Telegraph Company to build a commercial telegraph system for the use of the press and businessmen. By 1852 Carlisle, Kendal, Maryport, Whitehaven (and Oxenholme) were connected. By 1868, (within 25 years), Britain was connected to 650,000 miles of telegraph wire and 30,000 miles of submarine cable.

1852
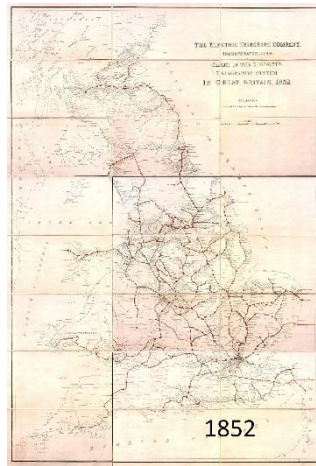
More than 20,000 towns and villages were part of the UK network. This allowed fast communications albeit very often of sad news, (disaster, death).

In 1868 Parliament decided to nationalise the system and authorized the purchase of the telegraph lines, and the Post Office began operating them in February 1870. Despite initial successes, it was soon apparent that the British postal telegraph faced serious financial obstacles, including an inflated purchase price, unremunerative press and railway rates, commercial rates which barely broke even. The telegraph's heyday was over by 1920, and by 1970 the telegraph had ceased to be an important communications medium in Britain. [132]

B. THE TELEPHONE

The records of the National Telephone Co. and those of British Telecommunication (or BT) have all the details for the statements below and with a full set of telephone directories from 1880 would be able to identify when Cumbria's telephone exchanges were installed.[133]

Alexander Graham Bell (a Scot living in the USA) developed the first practical telephone in 1875, though a number of other people had tried similar devices but had failed to follow them through to a working system.[134] Bell himself demonstrated how the telephone worked to Queen Victoria in 1878. Based on the Isle of Wight, Bell demonstrated the telephone through making calls to London, Cowes and Southampton.[134] From then on, the telephone began to make headway as a key feature of British life.

After Bell's demonstration, the Telephone Company Ltd was formed specifically for marketing Bell's patented telephones in Britain. The first exchange was in London in 1878 - it had a capacity for 150 separate phone lines and opened with approximately 8 subscribers.[135]

Telephone companies sprang up all over the country. "Call offices" (later renamed kiosks, or telephone boxes) also sprang up for the general public to use. The telephone service in the United Kingdom was originally provided by these private companies and local city councils, but by 1912–13 [136] all except the telephone service of Kingston upon Hull, Yorkshire and Guernsey had been bought out by the General Post Office.

Post Office Telephones was reorganised in 1980–81[137] as *British Telecommunications* (*British Telecom*, or *BT*), and was the first nationalised industry to be privatised by the Conservative government.[138] By 2002,there were 35 million main line telephones in the UK. However with the rapid development of mobile phones (see below) there was a steady decline in land-line phones and public call boxes were fairly rapidly withdrawn (becoming such as "library units" or bases for defibrillators. However land-lines remained necessary for a home computer, see Internet section below.

It is not clear when telephone companies established themselves in Cumbria but by 1894, the National Telephone Co. had call offices in Aspatria, Cockermouth Dalston, Harrington, Maryport, Whitehaven and Workington with a main office in Carlisle and so presumably telephone exchanges there or in a nearby town.[139]

The National Telephone Co applied to the Local Board to extend its exchange in Cockermouth in 1885, so the exchange must presumably have already been in existence.[1310]

C. MOBILE PHONES AND SOCIAL MEDIA

Mobile telephony has a long history that started off with experiments of communications from and to moving vehicle rather than handheld devices [1926,1946,1956 were dates of first elements of this]. Strictly this places them in the Radio Section below.[1311]

The first handheld mobile phones were mass produced by Motorola. On 3 April 1973

Comedian Ernie Wise made the first "public" mobile phone call in the UK from outside the Dicken's Pub in St Catherine's dock to Vodafone's HQ in 1985. He made the call in full Dickensian coachman's garb.[1312]

*These early mobile phones are often referred to as **0G** mobile phones, or Zero Generation mobile phones. Subsequent developments became known as second generation etc now reaching 5G.*

The world's first ever SMS [short messaging service] message or text was sent in 1992: It uses standardized communication protocols to enable mobile devices to exchange short text messages. SMS was the most widely used data application at the end of 2010, with an estimated 3.5 billion active users, or about 80% of all mobile subscribers.[1313]

In 2003, the 3G standard started to be adopted worldwide, kicking off the age of mobile internet and paving the way for the rise of smartphones.

Special programmes were produced ('applications' now shortened to 'apps') which opened up communications on a vast scale, from Skype, a godsend to people whose families were dispersed around the world,(by 2007) to such as Facebook, You Tube, Twitter, Instagram What's App (2009) and others. (all under the general heading of social media)

For The availability of mobile phone connections in Cumbria - see Radio section below.

E. THE INTERNET [1314]

Email started in 1965 as a way for multiple users of a time-sharing mainframe computer to communicate and is still a main source of communications for many.

In 1980's Tim Berners-Lee developed the World Wide Web, linking hypertext documents into an information system, accessible from any node on the network. [1315] Since the mid-1990s, the Internet has had a revolutionary impact on culture, commerce, and technology, including the rise of near-instant communication by electronic mail, instant messaging, voice over Internet Protocol (VoIP) telephone calls, two-way interactive video calls, and the World Wide Web with its discussion forums, blogs, social networking, and online shopping sites.[1316]

Initially working with the Internet was slow – one had to dial a connection through the telephone, which ran at a painfully slow 56 kbps.*[kilobit per second – a single character in a message requires 8-10 bits at least; For comparison, an 8Mbps connection [8000 kbps] is commonplace by 2019]*. This made it very, very difficult to download anything apart from text. A picture or drawing would take many minutes or even hours depending on the total amount of usage of the copper telephone lines. In addition to crawling speeds, dial-up internet was also extremely inconvenient because it took up full use of the telephone lines. People were unable to make phone calls and browse the

internet at the same time, forcing them to choose between massive inconvenience or the cost of a second line.

Broadband breathed new life into the internet in the early 2000s by allowing the signal in one line to be split between telephone and internet, meaning users could be online and make phone calls at the same time.[1317] This also led to faster connections, making it easier to browse the internet and download files. In addition the use of glass-fibre cabling instead of copper was developed allowing very much faster speeds so that it could be possible do download a film in seconds or minutes but this is taking a long time to install in the UK. Cumbria has a clear policy of providing fast broadband throughout the county in stages.[1318] Openreach, the UK's largest telephone and broadband network, announced (8 July 2019) that more than 100,000 premises across the UK are now part of its Community Fibre Partnership (CFP) scheme – more than 400 of which are in Cumbria.[1319]

F. RADIO (& TELEVISION)

The age of wireless telegraphy ("the wireless" or "radio") arrived in 1901 when Marconi after experimenting since 1894, successfully transmitted a signal from Cornwall to Newfoundland, although as in the earlier electrical communications above, there were many others exploring this before him. [1320] Continuing development, interrupted by World War I led in October 1922, to a consortium of radio manufacturers forming the British Broadcasting Company; they allowed some sponsored programs, although they were not what we would today consider a fully commercial station. It was dissolved in 1926, when its license expired; becoming the British Broadcasting Corporation, a non-commercial organization [BBC] in 1926 as the first public broadcasting company[1321]. In 1929 it also produced the first television transmission as well.

On November 2, 1936, the BBC began transmitting the world's first public regular high-definition TV service from the Victorian Alexandra Palace in north London. It therefore claims to be the birthplace of TV broadcasting as we know it today.[1322]

Whilst much of the population probably acquired a wireless set in the 1930's, television did not take off until after World War II.[1323]

These were one-way communications so most people were recipients only, getting news and entertainment as never before. In Cumbria, apart from some amateur radio enthusiasts ("hams" and those in the emergency services), ordinary folk would not experience using radio to communicate. These early radio broadcasts were "long-wave" and "medium-wave" which carried far and were little affected by the terrain - long-wave goes around the world.

In 2013, forty-eight per cent of adults in the UK listened to audio or radio online each week, an estimated weekly audience of 25 million, according to results from the first Audiometrics market research to measure listening behaviour.[1323, 1324]

But all this changed with the arrival of the mobile phone – this requires microwave contact to a local radio mast which has limited range. More masts help but there are still grumbles about "no signal" blackspots. With more developments, into 3G and 4G technology, the great majority of the population (especially youngsters) are in continuous contact with other people with the mobile phone becoming effectively a mobile computer with access to the internet.[1325]   Not to have an elaborate (and expensive) mobile in 2019, upgraded frequently, marks one out as eccentric or as an old fuddy-duddy unable to cope.

The main radio and TV transmission stations are at Sandale for BBC and Caldbeck for ITV. There are also main aerials at Anthorn and Skelton.[1326] These are essentially VLF (very low frequency which means very long wave) used for world-wide communications, not least for contact with submarines. Anthorn also transmits the National Time Signal (since 2007) on behalf of the National Physical Laboratory.

14. BICYCLES and MOTORCYCLES

Bicycles were introduced in the late 19th century in Europe [1401]

1886 Rover safety bicycle at the British Motor Museum.

The first modern bicycle, it featured a rear-wheel-drive, chain-driven cycle with two similar-sized wheels. Dunlop's pneumatic tire was added to the bicycle in 1888.

Bicycles and horse buggies were the two mainstays of private transportation just prior to the automobile, and the grading of smooth roads in the late 19th century was stimulated by the widespread advertising, production, and use of these devices. More than 1 billion bicycles have been manufactured worldwide as of the early 21st century. These numbers far exceed the number of cars, both in total and ranked by the number of individual models produced.[1402] They are the principal means of transportation in many regions.

Around the turn of the 20th century, bicycles reduced crowding in inner-city tenements by allowing workers to commute from more spacious dwellings in the suburbs. They also reduced dependence on horses. The safety bicycle gave women unprecedented mobility, contributing to their emancipation in Western nations. As bicycles became safer and cheaper, more women had access to the personal freedom that bicycles embodied, and so the bicycle came to symbolize the New Woman of the late 19th century, especially in Britain and the United States.[1403] The bicycle craze in the 1890s also led to a movement for so-called rational dress, which helped liberate women from corsets and ankle-length skirts and other restrictive garments, substituting the then-shocking bloomers.

Leisure: bicycles allowed people to travel for leisure into the country, since bicycles were three times as energy efficient as walking and three to four times as fast.

Sustrans was formed in Bristol in July 1977 as Cyclebag by a group of cyclists and environmentalists, motivated by emerging doubts about the desirability of over-dependence on the private car, following the 1973 oil crisis, and the almost total lack of specific provision for cyclists in most British cities, in contrast to some other European countries[1404]

Its flagship project is the National Cycle Network, which has created over 16,575 miles of signed cycle routes throughout the UK, but about 70% of the network is on previously existing, mostly minor roads, in which motor traffic will be encountered.

It is not known what that the scale of bicycle use has been in Cumbria but until cars became more commonplace in the late 1950's early 1960's, they were a common means of transport.[1405]

Motorcycles and Scooters

From the beginning, the concept of having a power drive on the bicycle was evident. Eventually a whole separate industry producing motor cycles or motorbikes grew up. Variants include scooters and by the 21st century even the humble bicycle was adding an electric drive (battery driven) to assist on hills etc.

The first commercial design for a self-propelled cycle was a three-wheel design called the Butler Petrol Cycle, conceived of Edward Butler in England in 1884.[1406]

1952 Lambretta scooter [1408]

In the 21st century, the motorcycle industry is mainly dominated by the Indian motorcycle industry and by Japanese motorcycle companies. In addition to the large capacity motorcycles, there is a large market in smaller capacity (less than 300 cc) motorcycles, mostly concentrated in Asian and African countries and produced in China and India. A Japanese example is the 1958 Honda Super Cub, which went on to become the biggest selling vehicle of all time, with its 60 millionth unit produced in April 2008.[1407]

The addition of power made the motorbike a valuable machine to allow people to travel greater distances to work, usually at a greater speed and flexibility over a car especially when congestion developed.

15. CARS

In 1879, Karl Benz was granted a patent for his first engine, which had been designed in 1878. [1501] Many of his other inventions made the use of the internal combustion engine feasible for powering a vehicle. His first *Motorwagen* was built in 1885 in Mannheim, Germany.

1894 Benz Velo

13

He was awarded the patent for it. In August 1888 Bertha Benz, the wife of Karl Benz, undertook the first road trip by car, to prove the road-worthiness of her husband's invention. Benz made-the Velo in 1894, the first production vehicle.[1502]

1927 FORD Model T

The assembly line style of mass production and interchangeable parts (originally based upon stationary assembly line techniques pioneered by Marc Isambard Brunel) was greatly expanded by Henry Ford, beginning in 1913 with the world's first moving assembly line for cars.[1503]

As a result, Ford's cars came off the line in fifteen-minute intervals, much faster than previous methods: In 1914, an assembly line worker (in USA) could buy a Model T with four months' pay.[1503]

In Europe, much the same would happen. Morris set up its production line at Cowley (Oxford) in 1924, and soon outsold Ford: in 1925, Morris had 41% of total British car production. By 1922 there were 183 motor companies in the UK, but by 1929, following the slump years, there were 58 companies remaining.[1504] In 1937 the UK produced 379,310 passenger cars.[1505]

Initially cars would have been the domain of the well-to-do although once the assembly-line system produced its cheaper cars, others would have been able to afford them. But in Britain, the aftermath of World war I, the depression of the late 1920ʹs to 1930ʹs would have held back the rapid expansion of car ownership seen in America. In 1931 there were 2.3M vehicles on the road (probably including goods vehicles)[1506] Figures for car ownership in Cumbria(as it would be), if they exist, are not easily found, but with a population of about 376000 in 1931 out of 63,100,000 for UK (0.6%) a maximum proportion of car ownership would have been 14,000,[1507] but in practice, with the depression of

the West Coast, and the time it took for fashions to spread this far north a realistic figure would probably be much lower, say 10,000. Overall in the UK, there were recorded 30,654,621 cars or vans in 2011.[1508] However given the remoteness of much of the county, and the lack of public transport compared with the larger cities, it is not surprising to find that in 2011 whilst 25.8% of households in England as a whole have no car, in Cumbria this figure is only 21.4% (roughly 47500 out of 222,000). [1508]

Whist having a car has become more important than ever for those living in rural villages, the down side is that many thousands come to visit the Lake District at weekends and holiday times so that traffic congestion has become a major problem for places like Ambleside.

Cumbria once had its own car manufacturer in Cockermouth:

"Between Tom Rudd Beck and the railway once stood the large mill of the Cockermouth Tweed Company - hence 'Tweed Mill Lane'. The building was erected in 1872-4……At its peak between three and four hundred people were employed. By 1897 the premises were known as the Atlas Works and occupied by A. and H. Rea, manufacturing confectioners.

Then in January 1913 they were leased by a syndicate newly formed to manufacture cycle cars, under the management of J. A. Forrester, son of a local coach-builder. There was a growing demand for these small three or four wheeled cars with motor cycle features and the Cockermouth firm planned to produce two models. 'The Cycle Car' of August 1913 commented -

"Far away in the little town of Cockermouth, on the West Coast of Cumberland, an old tweed mill has been converted into an up-to-date cycle-car manufacturing works, and is now engaged in turning out two cycle cars of unusual design. The first is chain-driven with an 8 h.p. J.A.P. gearbox by a Coventry silent chain and thence the rear axle… The clutch is of the internal cone type, lined with Ferodo, and fitted on the primary shaft. The brakes are of the external band type, one being operated by a side lever, the other by a foot pedal, and both working on the rear wheels.... the whole machine ... sells for 122 guineas." [£128]

The second model, of 6-8 h.p., was air-cooled and had a specially designed Sturmey Archer gearbox giving three forward speeds and reverse and sold for 97 guineas.(£102)

This new Cockermouth industry was presumably killed by the outbreak of war in 1914. As far as is known no 'Cumbria' car survives, only one wire-spoked wheel and it is not known whether this was made in the tweed mill or supplied from elsewhere.

The mill was demolished about 1918. [1509]

16. MODERN ROADS

Roads were greatly improved in the late 18th and early 19th centuries by Thomas Telford [161] and John MacAdam. [162] Tarmac was patented by British civil engineer Edgar Purnell Hooley, who noticed that spilled tar on the roadway kept the dust down and created a smooth surface. He took out a patent in 1903 for tarmac.[163]

The Roads Act 1920 brought in the Road Fund, with the Government receiving revenue from excise duty on road vehicles and from the sale of licences for horse-drawn carriages and driving licences.[164] As road traffic began to grow, the condition of the road network became an issue, with most of it in a poor state of repair.[165] A new Ministry of Transport created a classification system for the important routes connecting large population centres or for through traffic, with the definitive list being published in 1922/3 and revised in 1926/7. [166]

In 1930, responsibility for all roads was vested in the County councils. [167] Then for the first time since the Roman occupation, the Ministry of Transport took direct control of the core road network through the Trunk Roads Act 1936.[168]

The German autobahns formed the first limited-access, high-speed road network in the world, with the first section from Frankfurt-am-Main to Darmstadt opening in 1935.[169]

The Special Roads Act 1949 gave the UK government legal powers to build roads that were not automatically rights of way for certain types of user.

In Britain motorways were built in stages, often starting with the by-passes of major towns and then later joined up. In 1958, the first motorway was opened as the Preston Bypass, now part of the M6 motorway; the first major inter-urban, motorway to be opened was the 67 mile (107km) length of the M1, between Crick and Berrygrove, opened in November 1959. This was the first

section of the M1 London to Yorkshire motorway. It was followed by the Lancaster bypass in 1960.

M6 Motorway in S Cumbria

In Cumbria , Penrith by-pass 1968, Lancaster to Penrith (through the Lune Gorge) in 1970, Carlisle by-pass 1970 and completion of the "M6 gap" to join up with the Scottish A74(M) in 2008.[1610]

Thus by this date the 317 miles or so from Carlisle to London could be driven (297 on motorway) in something like 4½ hours (at maximum legal speed of 70 mph) but in practice with extra time for the ~20 miles in urban areas at the ends, plus rest stops (highly recommended) plus speed restriction for road works (always somewhere), the AA planner suggests 5½ h as a more reasonable estimate.

Nearly all of Cumbria's main roads became A roads, just a few only B-roads. Ho

17. AIR TRAVEL

Cumbria saw several places involved in the early development of aviation.[171] Then World War II saw many airfields constructed on Cumbria's flat lands, well away from the main targets of bombing raids. These airfields were used for receiving new aircraft, fitting out, training and maintenance.[172]

After the war just four of these remained in use in some form.

CARLISLE AIRPORT at Crosby-on-Eden, owned by Carlisle City Council (one of the first councils to buy an airfield in 1931 (at Kingstown – not this one) attempted to develop passenger services to London, Belfast and Dublin in 1993 but the business rapidly failed.   A revived attempt started in 2019 with flights to London (Southend), Belfast and Dublin.[173]

WALNEY AIRFIELD was acquired by Barrow Council in 1946, but attempts to use it for passenger services in 1982-3(to Edinburgh, Carlisle and Liverpool),

1984 (to Manchester) and 1991-2 (to Manchester and Blackpool) were all short-lived.[174] Vickers (later BAE) had taken over the operation in 1968 and as BAE, having upgraded the airfield in 2006, use it for their own executives but allow gliding and private aircraft to use it.[175]

CARK AIRFIELD (at Flookburgh) is in private hands and is used for private planes and also for the North-West Parachute Club base.

KIRKBRIDE AIRFIELD is also used for private planes.

[The Great North Air Ambulance is based at Langwathby.]

The outcome of the above is that Cumbrians who wish to fly to most parts of the world must travel at least as far as Manchester (to which airport there are direct trains from N. Cumbria and from Barrow) or to Newcastle or Glasgow Airports.

[At Great Orton, the defunct airfield was used in 2001 to bury 466,312 carcases of animals slaughtered to contain the spread of foot-and -mouth disease.][176]

SOURCES AND REFERENCES   All sources retrieved 7 August 2019

12. TRAMS & MODERN BUSES

124 With the advent of mass-produced steel (at around 1860), horse-buses were put on rails as the same horse could then move 3 to 10 times as many people. This was not only more efficient, but faster and produced, in an age of unpaved streets, a far superior ride.

125 https://uktram.com/systems/birkenhead-trams/

126 C. N. Pyrgidis. Railway Transportation Systems: Design, Construction and Operation. CRC 131Press, 2016. P. 156 cited [Accessed 28 July 2019]

127"Riding on a knifeboard". *London Museum. Archived from* the original *on 2012-12-02.*

128 https://en.wikipedia.org/wiki/List_of_town_tramway_systems_in_the_United _Kingdom#North_West_England: [Accessed 28 July 2019]

129 The Carlisle Tramways Order of 1898 authorised the construction of an electric tramway and construction began in 1899. The system comprised 6 lines radiating from Carlisle railway station to Newtown, Stanwix, along

Warwick Road to Petteril Bridge, London Road, Boundary Road and Denton Holme. https://en.wikipedia.org/wiki/City_of_Carlisle_Electric_Tramways [Accessed 28 July 2019]

1210 https://en.wikipedia.org/wiki/City_of_Carlisle_Electric_Tramways

1211 https://en.wikipedia.org/wiki/Karl_Benz

1212 Dunbar, Charles S. 1967. *Buses, Trolleys & Trams* Great Britain: Paul Hamlyn Ltd. [republished 2004 with ISBN 0-7537-0970-8 or 9780753709702] p. 23. Cited [Accessed 28 July 2019]

1213 *Tramways and Urban Transit* No. 956, August 2017, p. 301 cited [Accessed 28 July 2019]

1214 https://en.wikipedia.org/wiki/Bus#Motor_buses

1215 *Robbins, G. J.; Atkinson, J. B. (1991). The London B-Type Motor Omnibus (3rd ed.). Twickenham: World of Transport.* ISBN 1-871979-04-8*.*

1216 http://wtht.co.uk/workington-buses/

1217 Cumberland, Ribble, United, Caledonian

1218 https://en.wikipedia.org/wiki/National_Bus_Company_(UK) [Accessed 28 July 2019]

1219 https://en.wikipedia.org/wiki/Stagecoach_Group

13 ELECTRICAL COMMUNICATIONS

TELEGRAPH

131 http://distantwriting.co.uk/Documents/ETC%20GreatBritain%201852.jpg

132 https://ethw.org/Telegraph

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134, 135 https://www.thoughtco.com/history-of-the-telephone-alexander-graham-bell-1991380

133, 137, 138, 1311 https://www.britishtelephones.com/histuk.htm

136 Photo by Stavros 1, June 2009

https://commons.wikimedia.org/w/index.php?curid=7042486https://en.wikipedia.org/wiki/History_of_telecommunication

139 Kelly's Directory of Cumberland, 1894

1310 Bradbury 'History of Cockermouth', citing West Cumberland Times 25 Feb 1885

1312, https://www.uswitch.com/mobiles/guides/history-of-mobile-phones/

1313 *Ahonen, Tomi T. (January 13, 2011).* "Time to Confirm Some Mobile User Numbers: SMS, MMS, Mobile Internet, M-News". *Communities Dominate Brands.* Retrieved 2016-09-27.

1314 to 1316 https://en.wikipedia.org/wiki/History_of_the_Internet

1317 https://www.uswitch.com/broadband/guides/broadband_history/

1318 http://www.connectingcumbria.org.uk/

1319 https://www.cumbriacrack.com/2019/07/08/rural-communities-in-cumbria-celebrate-broadband-milestone/

Broadband was available in Papcastle by 2006 at 2.2Mbps; with fibre in 2016 (initially at 28Mbps but declining to 15 Mbps by 2019 as more users used the facility. (ECA personal records)

RADIO & TELEVISION

1320 https://en.wikipedia.org/wiki/History_of_radio#Marconi

1321 https://en.wikipedia.org/wiki/History_of_broadcasting#United_Kingdom

1322 https://en.wikipedia.org/wiki/History_of_television#United_Kingdom

1323 In 1930, more than 40 percent of American households owned a radio. A decade later that number more than doubled, to 83 percent.

1324 https://advanced-television.com/2013/06/12/half-of-uk-listens-to-online-radio

1325 Nine in ten people had access to the internet in the home in 2018. The majority (62%) of time spent on the internet was on mobile devices, from https://www.ofcom.org.uk/about-ofcom/latest/media/facts

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