

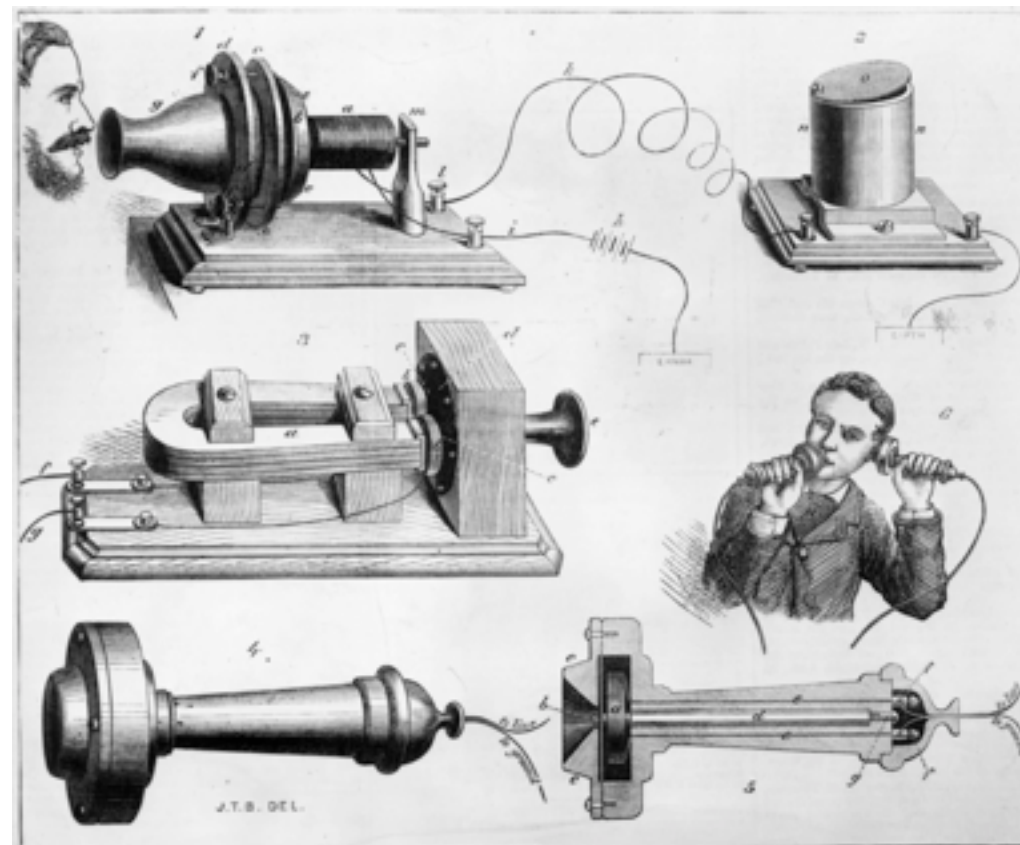
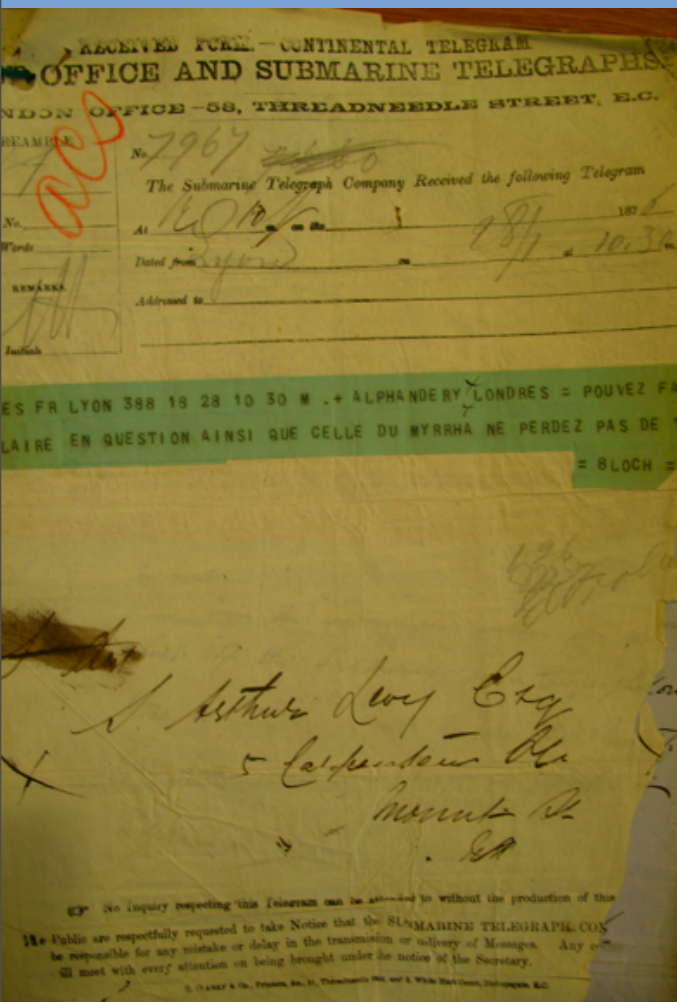


# communications revolution

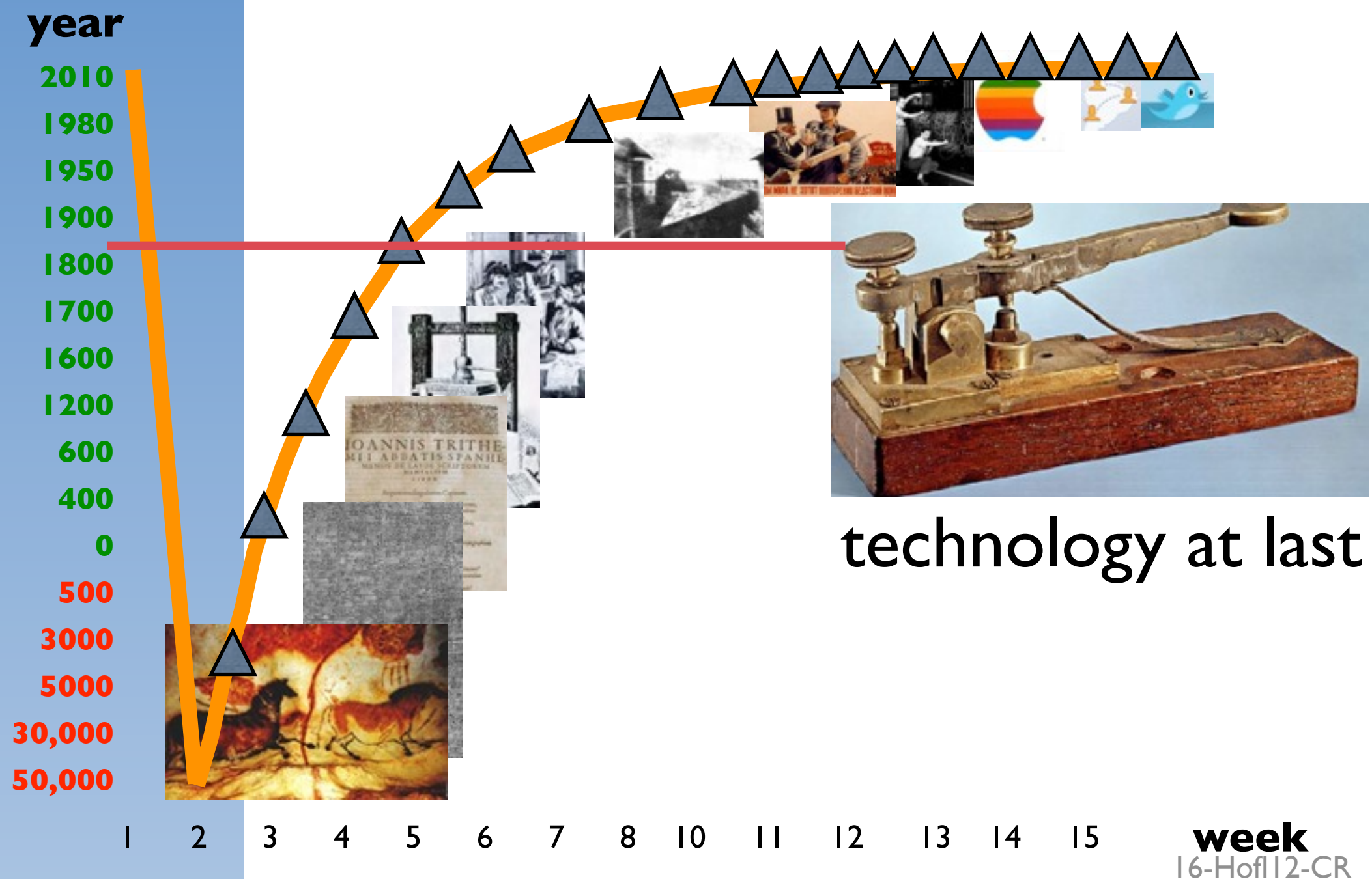
## telephone & telegraph

History of Information

March 8, 2011



# something happened



# overview

wishing on  
technology

inventing  
inventors?

eyewitness  
enthusiasm

communications  
revolution

changing  
world



# nineteenth century: a changing world

John Gast  
*American Progress*  
1872





# communications needs

---

reach

speed

frequency

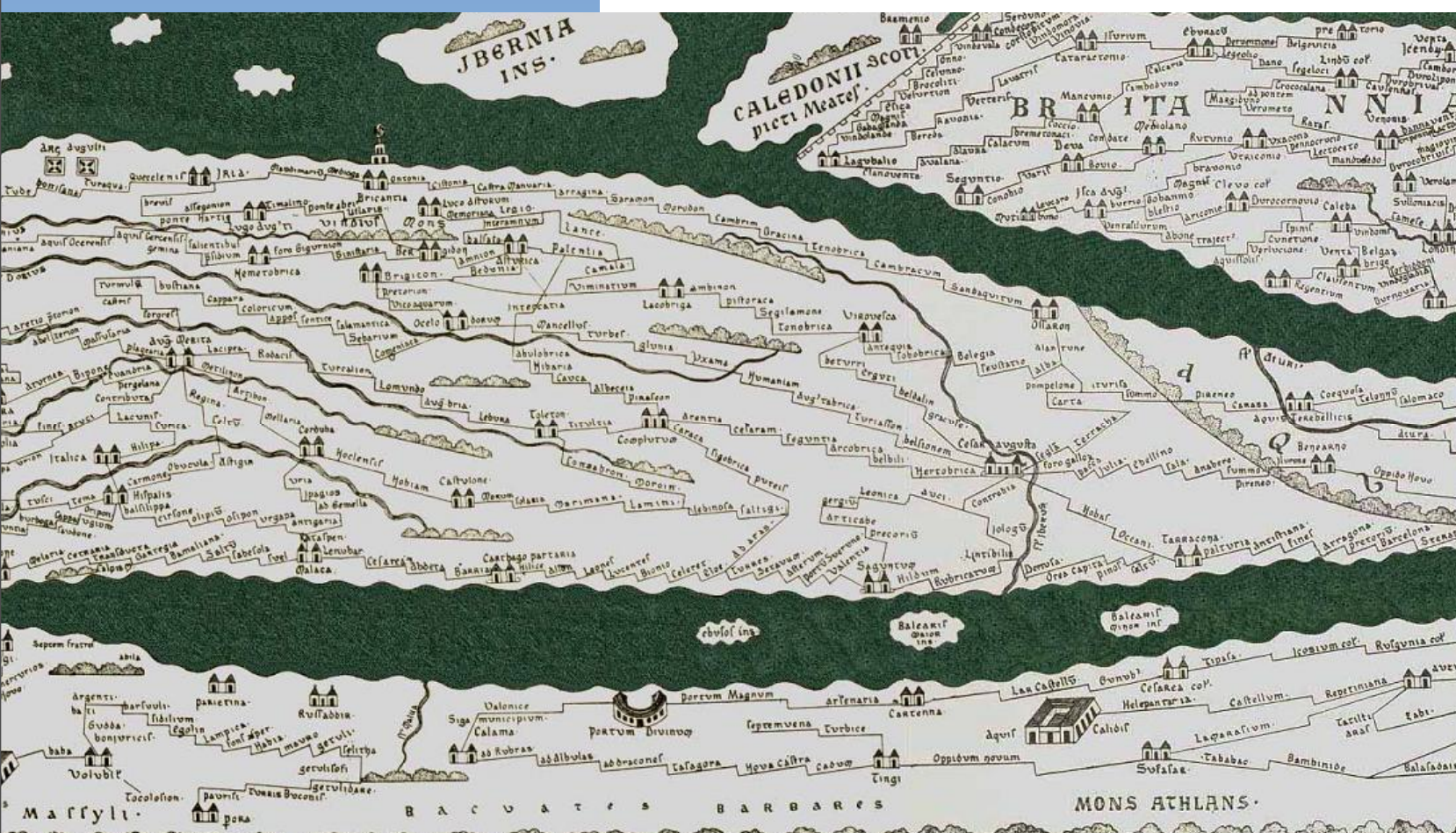
regularity



by land

## Rome to Holy Roman Empire

"it took twenty-six days for Caesar to send a letter from Britain to his dear friend Cicero in Rome"



Franz von Tassis, 1489





# by land

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## mail coach

roughly 8 mph



## train

"the Average speed of the early railways in England is 20 to 30 miles an hour ... roughly three times the speed previously achieved by stagecoaches"

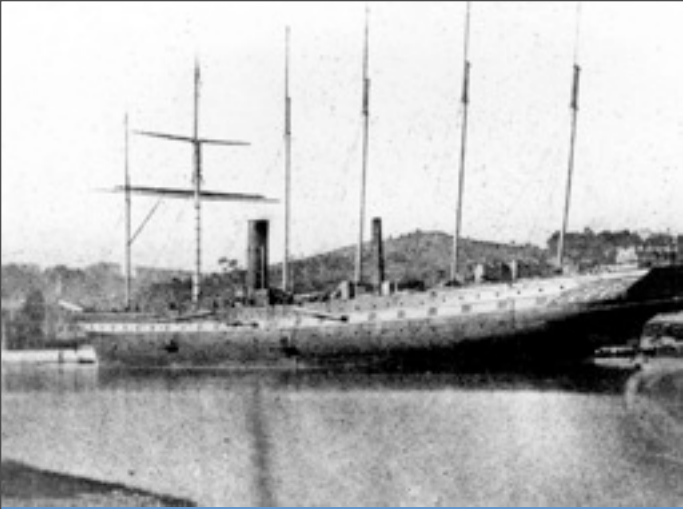
--Wolfgang Schivelbusch,

"Railroad Space & Railroad Time," 1978

I6-Hof112-CR 8







# by sea

TRADE BETWEEN LONDON AND  
BOSTON, U.S.A., 1765-71 (clxxi. 158).—  
In 1775 the postal communication with the  
British Dominions in America was by five  
packet-boats between Falmouth and New  
York, sailing from the former the first Satur-  
day, from the latter the second Saturday in  
every month, they were,  
Halifax, Capt. John Bolderson.  
Duke of Cumberland, Capt. John Mitchell.  
Lord Hyde, Capt. Norris Goddard.  
Harriot, Capt. Geo. Oake.  
Mercury, Capt. Rob. Dillon.

The postage between London, and any port  
within the British Dominions in America, of  
a single letter (i.e., one sheet of paper) was  
12d., which covered inland conveyance in the  
Dominions up to 60 English miles; from 60 to  
100 miles, 6d.; 100 to 200 miles, 8d., not pas-  
sing through a chief office; and so in pro-  
portion increasing two-pence for any distance  
above every 100 miles. All double, treble,

## messages by sea

irregular: merchant ships

regular: packet boats

speed: steam

"soon afterwards the Britannia steam-  
packet from Liverpool, eighteen days out,  
was telegraphed at Boston."

--Charles Dickens, *American Notes*, 1842

63

To and from Albany and Buffalo, by the Erie Canal.

Passengers by the Canal will reach Buffalo from Albany, or Albany from Buffalo, in travelling by line boat, in about six days. The usual rate of fare is 1 cent per mile without, or 1 1/2 cents with board. Traveling by packets, passengers from and to Buffalo and Schenectady arrive in about 3 1/2 days. No packets ply between Albany and Schenectady.

Albany	7	Cascadota	2	146	Port Gibson	3	235
West Troy	7	New Boston	4	156	Palmyra	5	240
Junction	2	Chittenango	3	153	Fairport	12	252
Schenectady	21	Kirkville	5	158	Fulton's Basin	1	253
Amsterdam	17	Marion	4	162	Potsford	6	259
Schoharie Creek	5	Oswego	3	165	Rochester	10	269
Fultonville	5	Syracuse	6	171	Spencer's Basin	12	281
Spencer's Basin	9	Geddesburg	2	173	Adams	3	284
Canajoharie	3	Nine-mile Creek	5	178	Brockport	5	289
Fort Plain	3	Camillus	1	179	Holley	5	294
Little Falls	16	Canton	5	184	Hubertson	4	298
Herkimer	7	Jordan	6	190	Albion	6	304
German Flats	2	Weed's Port	6	196	Eagle Harbour	3	307
Frankfort	4	Centre Port	1	197	Knowlesville	4	311
Utica	9	Port Byron	2	199	Madira	4	315
Whitesboro	4	Mostozama	6	205	Middleport	6	321
Otskany	3	Lockport	6	211	Lockport	12	333
Rome	8	Clyde	5	216	Fondleton	7	340
New London	7	Lions	9	225	Fondleton	12	352

Eerie  
Canal  
1825

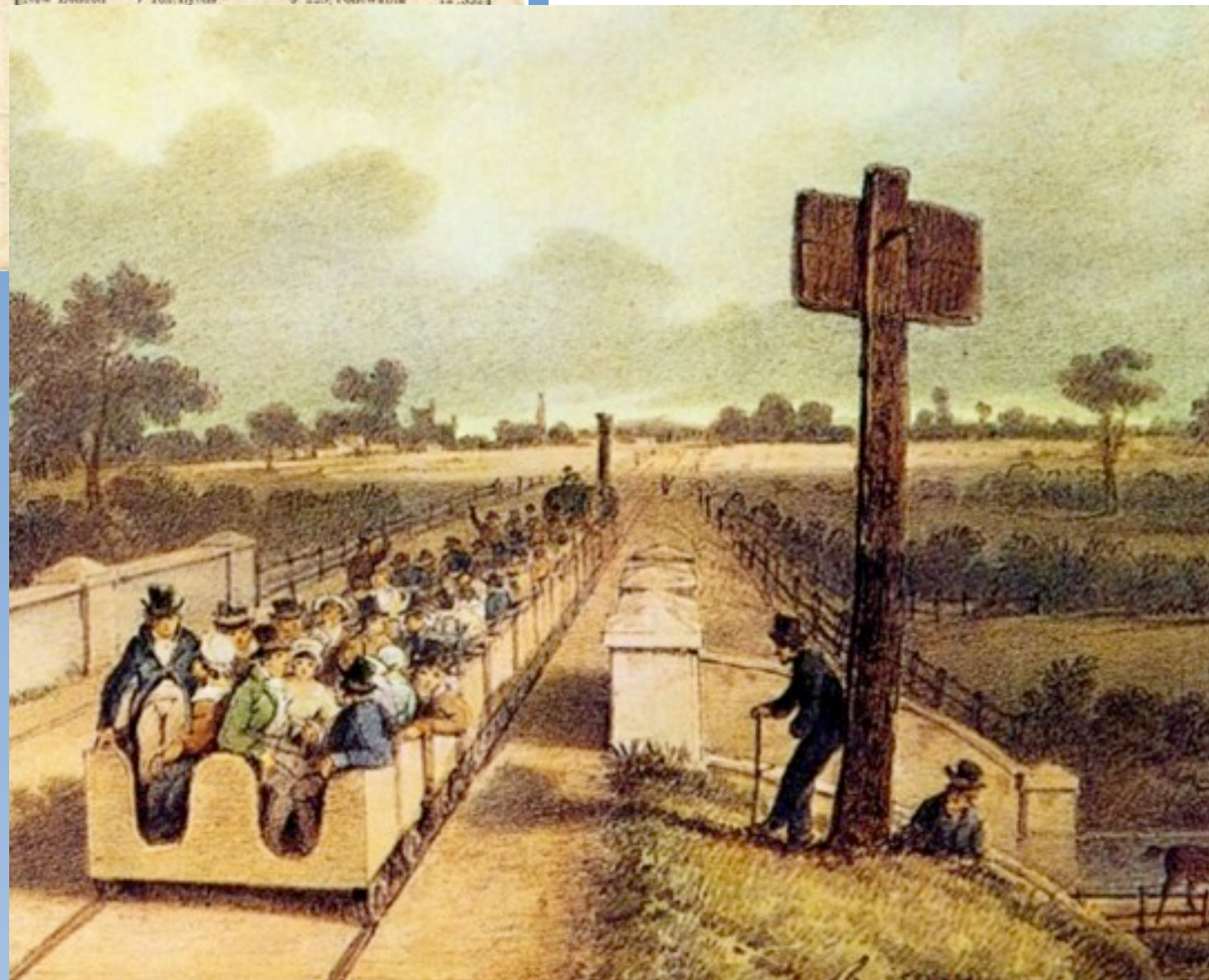


growing infrastructure

roads

canals

railways



Manchester-Liverpool  
1830

I6-HofI12-CR 10





63

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Junction	2	Chittenango	3	153	Fairport	12	252	
Schenectady	21	30	Kirkville	5	158	Fulton's Basin	1	253
Amsterdam	17	47	Marion	4	162	Potsford	6	259
Schoharie Creek	5	52	Oswego	3	165	Rochester	10	269
Fultonville	5	57	Syracuse	6	171	Sprenger's Basin	12	281
Sprenger's Basin	9	60	Geddesburg	2	173	Adams	3	284
Canajoharie	3	69	Nine-mile Creek	5	178	Brookport	5	289
Fort Plain	3	72	Camillus	1	179	Holley	5	294
Little Falls	16	88	Canton	5	184	Hubertson	4	298
Herkimer	7	90	Jordan	6	190	Albion	6	304
German Flats	2	97	Weed's Port	6	196	Eagle Harbour	3	307
Frankfort	4	101	Centre Port	1	197	Knowlesville	4	311
Utica	9	110	Port Byron	2	199	Madina	4	315
Whitesboro	4	114	Mostozama	6	205	Middleport	6	321
Otskany	3	117	Lockport	6	211	Lockport	12	333
Rome	8	125	Clyde	5	216	Fondleton	7	340
New London	7	132	Lyons	9	225	Fenewatola	12	352

Eerie  
Canal  
1825



# growing infrastructure



Manchester-Liverpool  
1830

I6-HofI12-CR 10



# growing organization



## CHAPTER XCVII.

### AN ACT

*To provide for the construction of Telegraph Lines within the State of California.*

*The People of the State of California, represented in Senate and Assembly, do enact as follows :*

SEC. 1. The right and privilege is hereby granted to Oliver E. Allen and Clark Burnham, or their assigns, to construct and put in operation an Electro-Magnetic Telegraph Line, from the city of San Francisco to the city of Marysville, by the way of the cities of San Jose, Stockton and Sacramento, with right of way over any lands belonging to this State, and on or along any streets, roads or highways, or across any stream or streams; *Provided*, they do not obstruct the same, and no person or persons shall be allowed to locate, or construct, or run any Telegraph Line, or any portion thereof, within half a mile of the Line or route selected by the said Allen and Burnham or their assigns, except that when within half a mile of any incorporated city, the proprietors of any similar Line of Telegraph, may enter said city and depart therefrom, making their Station therein, within twenty yards of the Station of said Allen and Burnham, or their successors, for the term of fifteen years; *Provided*, that the said above named parties or their assigns shall, within eighteen months from the passage of this Act, construct and put in operation a Tele-

To whom granted

Rights and privileges.

Duty of grantee.

# growing control

## **US** patent law, 1790

"An act to promote the Progress of Useful Arts"  
revised, 1836--examinations introduced

## **UK** Statute of Monopolies

Patent Law Amendment Act, 1852, Patent reform, 1883

## **France** 1791, 1800, 1844

## **patent confusion**

"SDG" [sans garantie du gouvernement]

**patent resistance & patent boom**  
(but not "patent medicines")



Crystal Palace  
1852



# interconnections

## **cables**

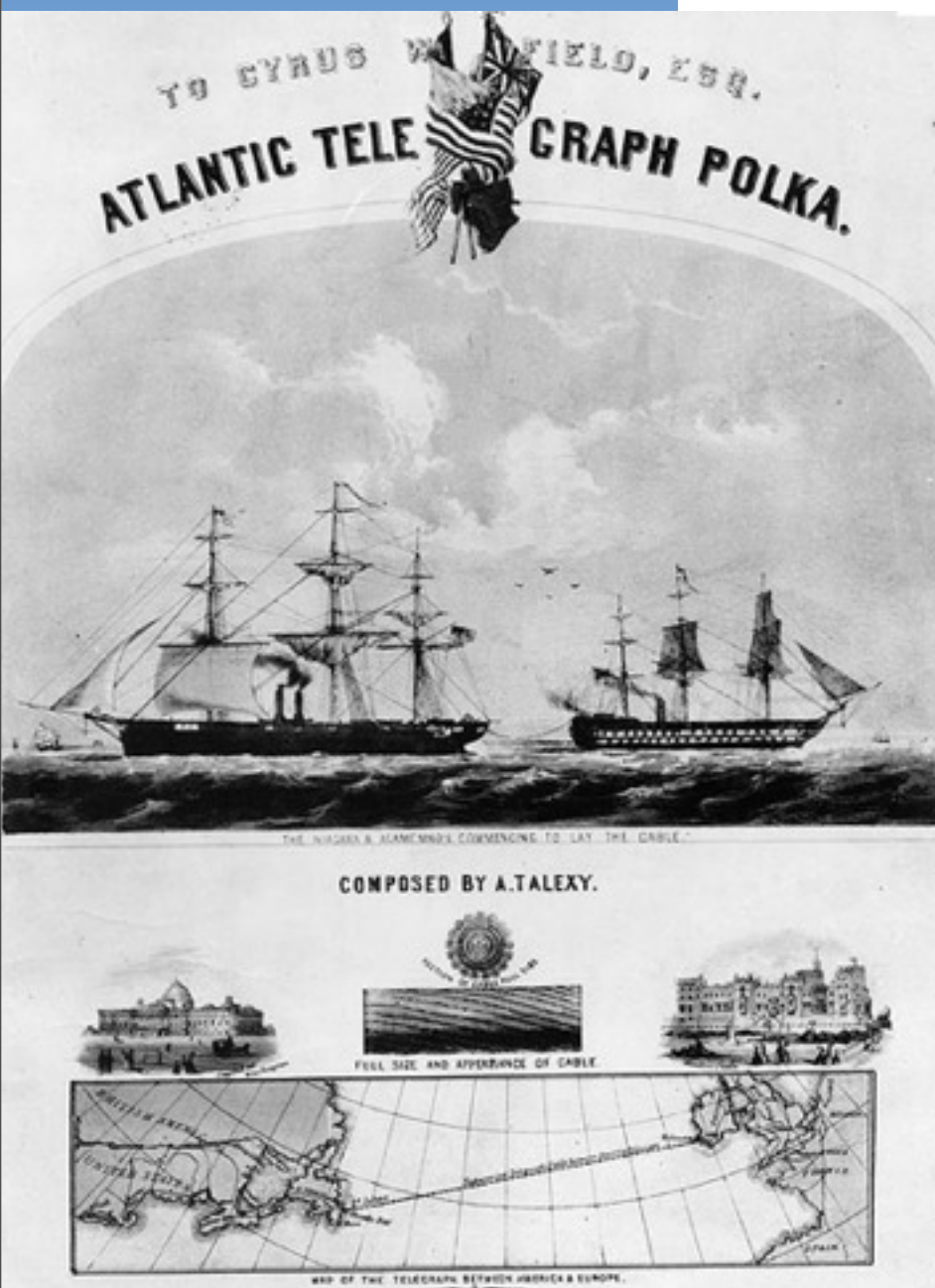
(but also treaties, standards)

Prussia-Austria: 1849

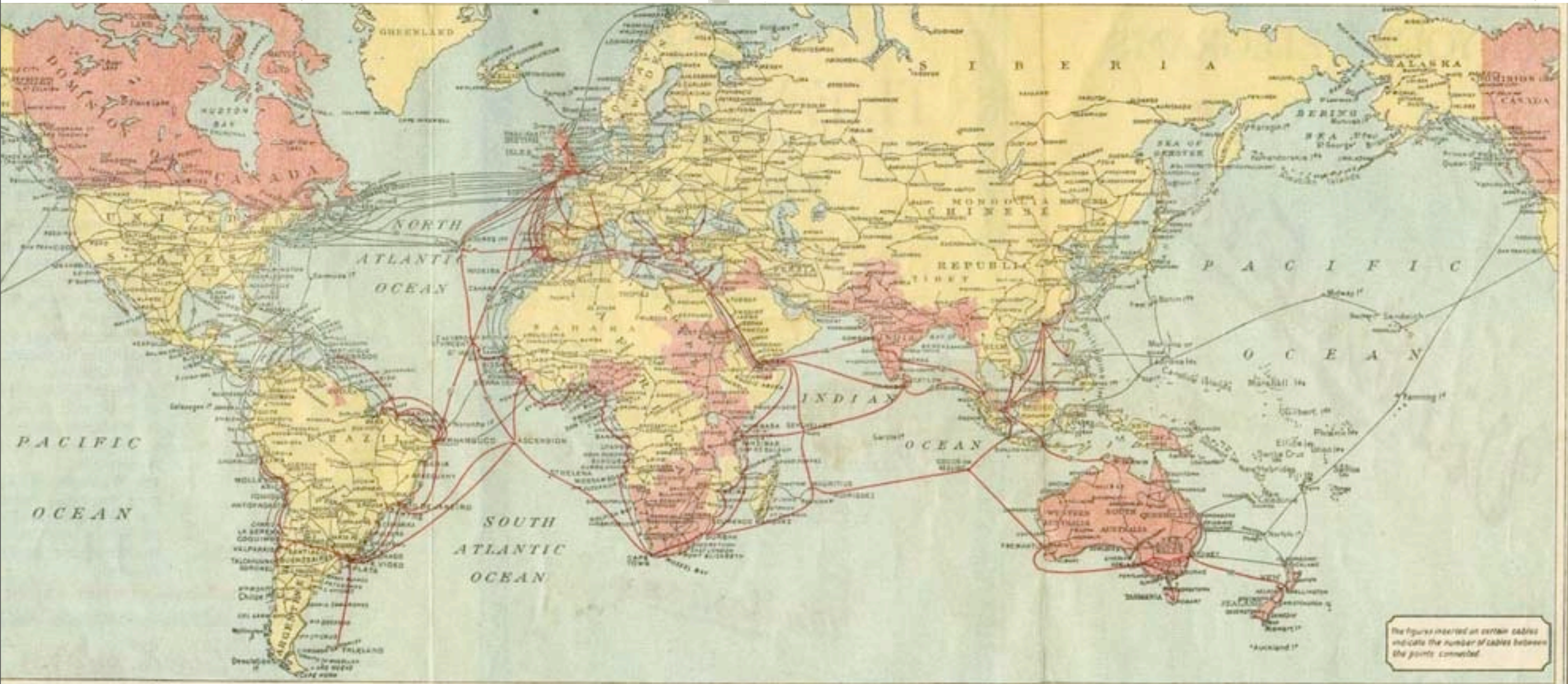
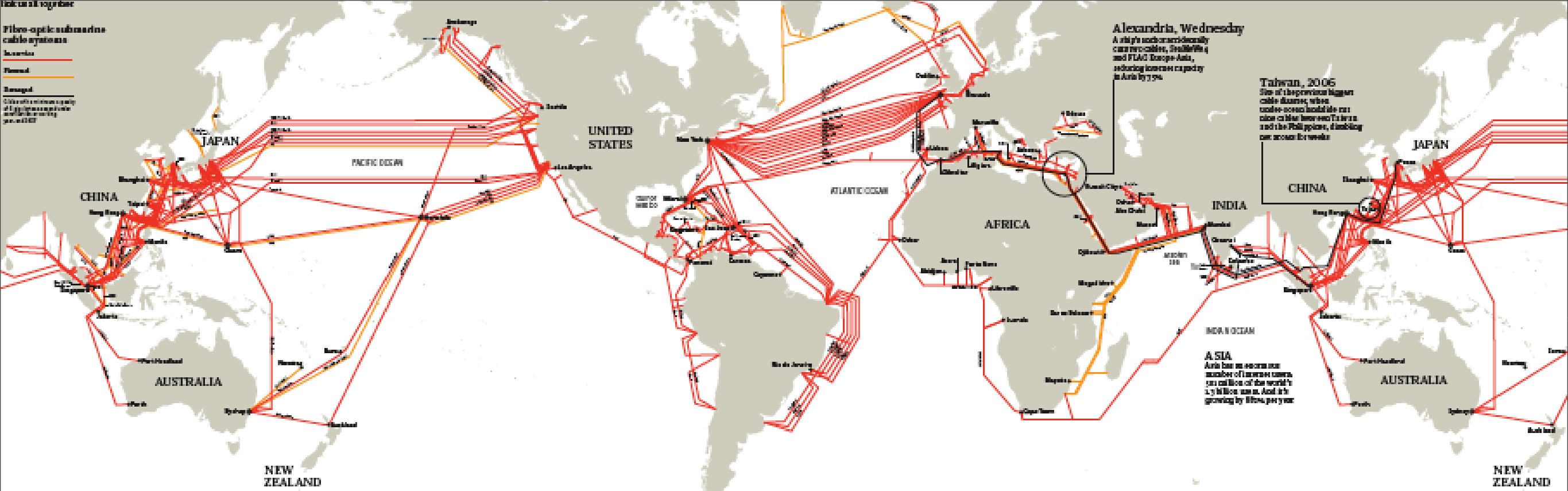
England-France: 1851

New York-Newfoundland: 1856

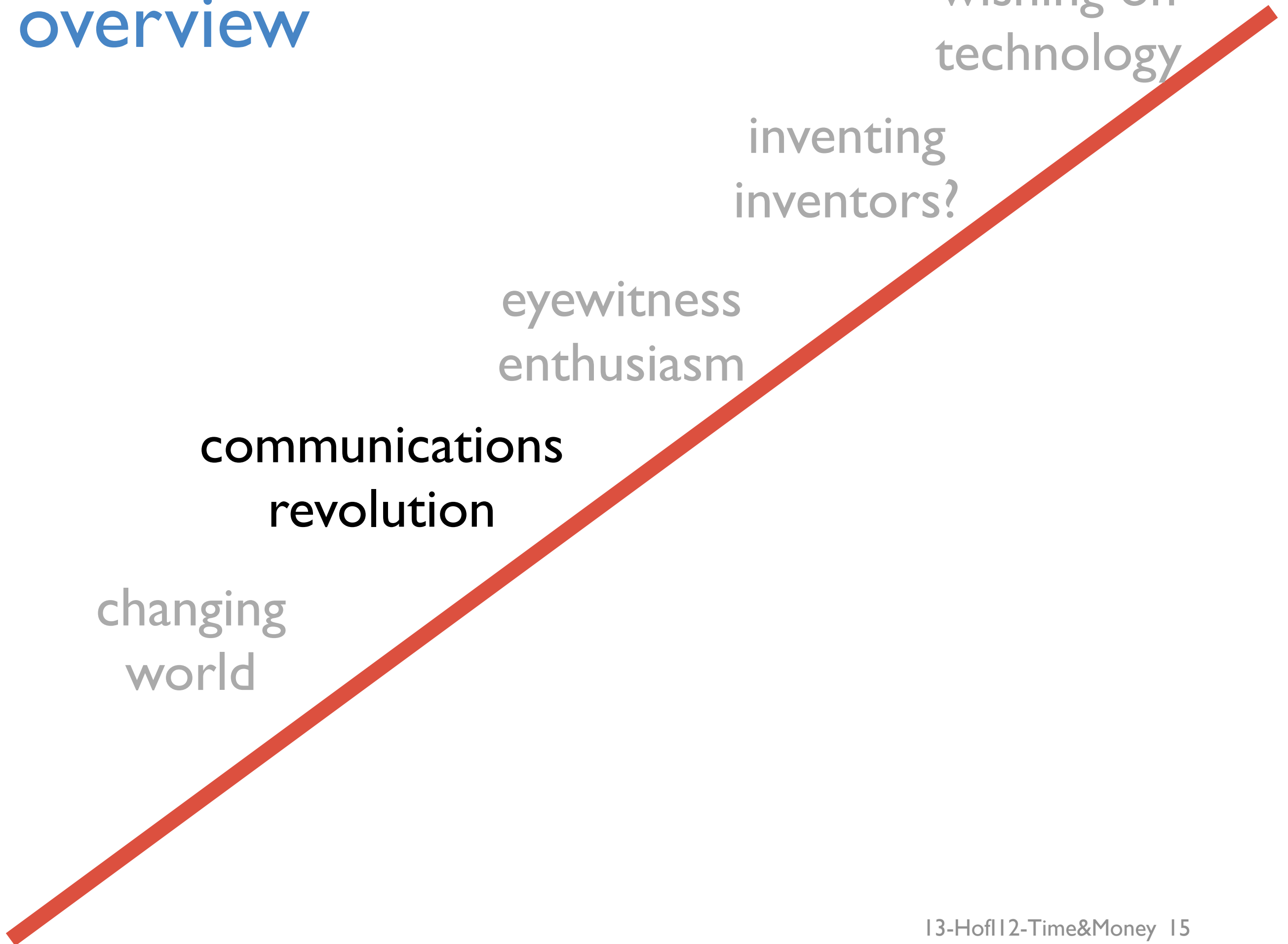
Britain-North America: 1858-1866





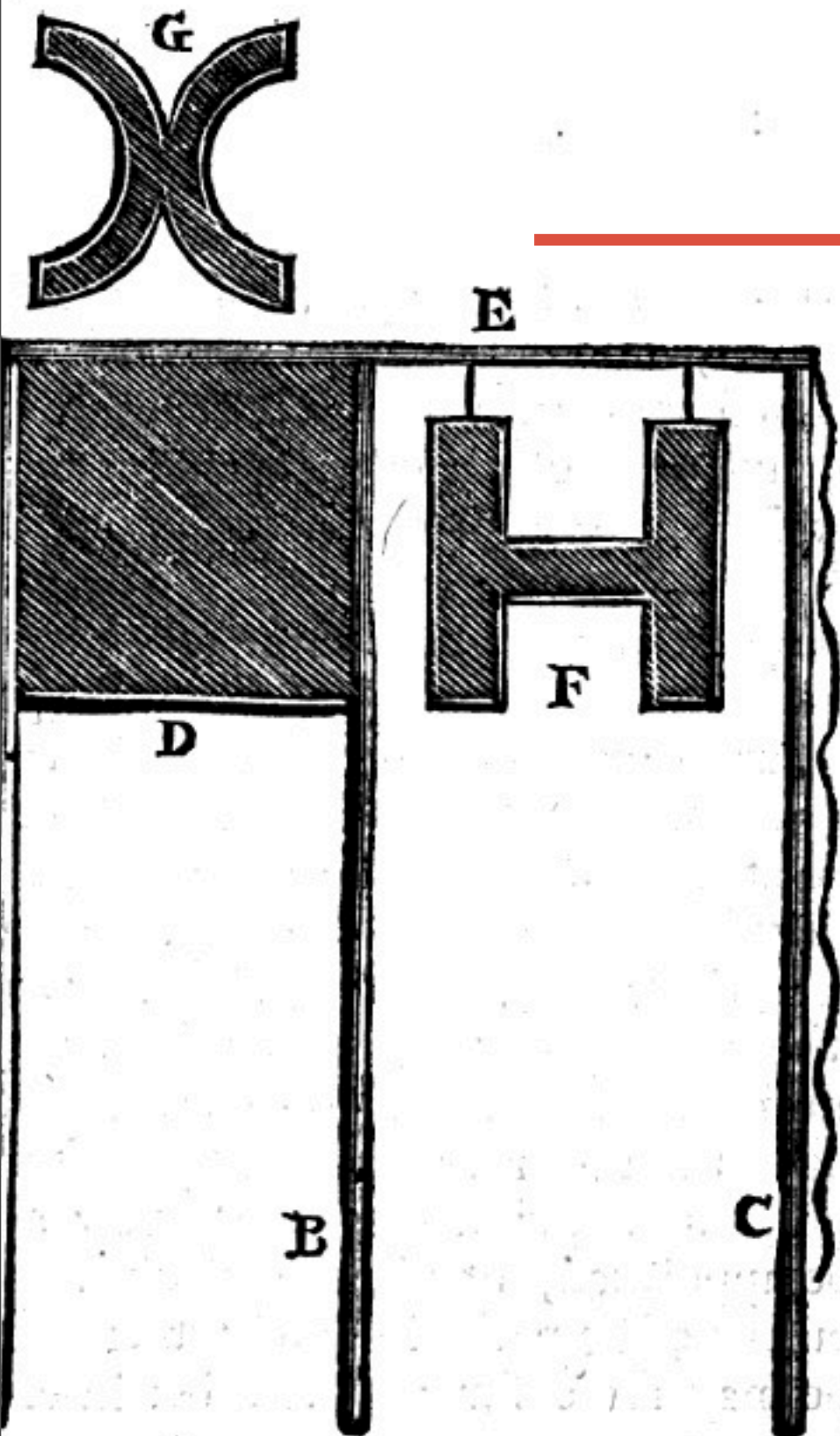


# overview





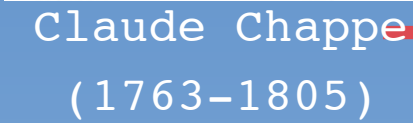
# messages without messengers



*Dr. HOOK's Discourse to the Royal Society, May 21. 1684. shewing a Way how to communicate one's Mind at great Distances.*

**T**HAT which I now propound, is what I have some Years since discoursed of; but being then laid by, the great Siege of *Vienna*, the last Year, by the *Turks*, did again revive in my Memory; and that was a Method of discoursing at a Distance, not by Sound, but by Sight. I say therefore 'tis possible to convey Intelligence from any one high and eminent Place, to any other that lies in Sight of it, tho' 30 or 40 Miles distant, in as short a Time almost, as a Man can write what he would have sent, and as suddenly to receive an Answer, as he that receives it hath a Mind

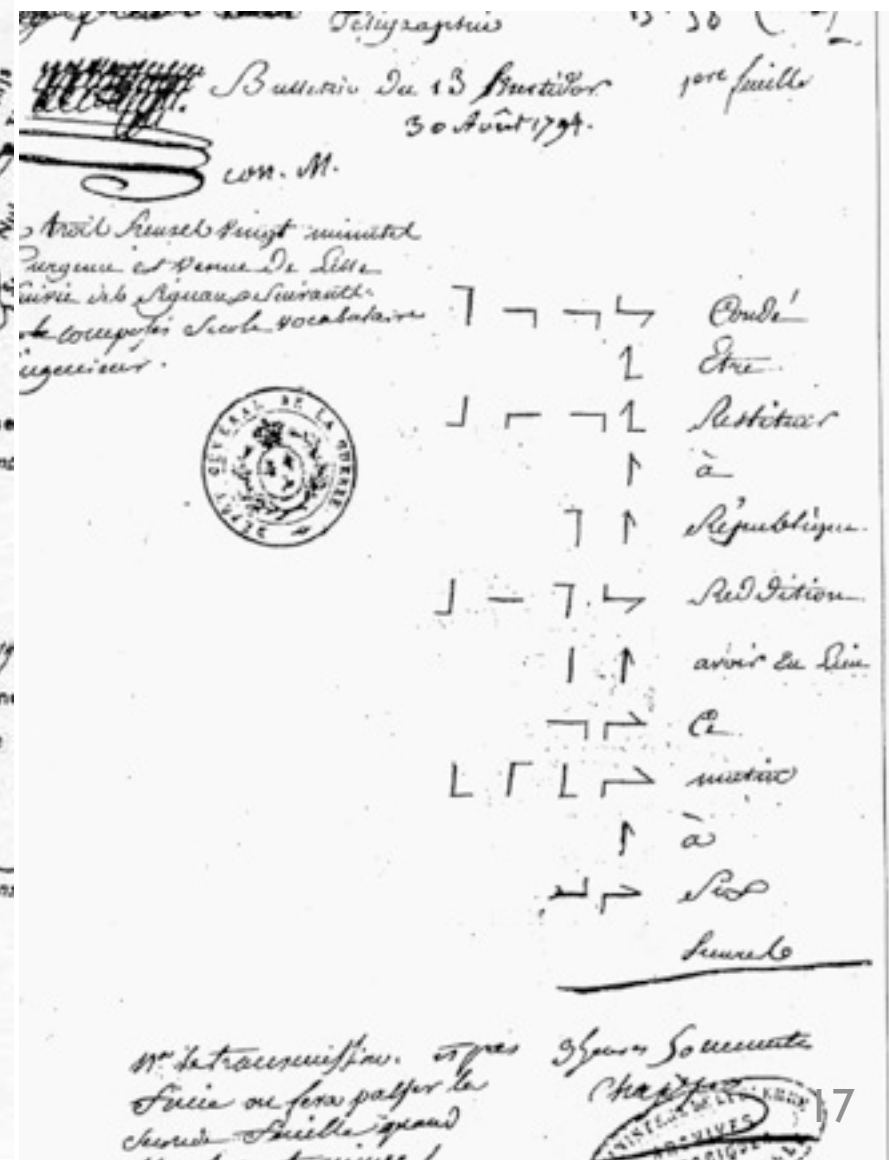




30 August, 1794



## A historical illustration of a building, possibly a church or schoolhouse, with a dark roof and a tall, slender chimney. The building has three arched windows on the front facade. To the left of the building is a grid of 30 symbols arranged in 6 rows and 5 columns. The symbols are various geometric shapes and characters, some resembling letters or numbers, and are arranged in a systematic pattern. The background shows a simple landscape with a hill and a body of water.





# national system

5,000 km/3,125 m

534 stations

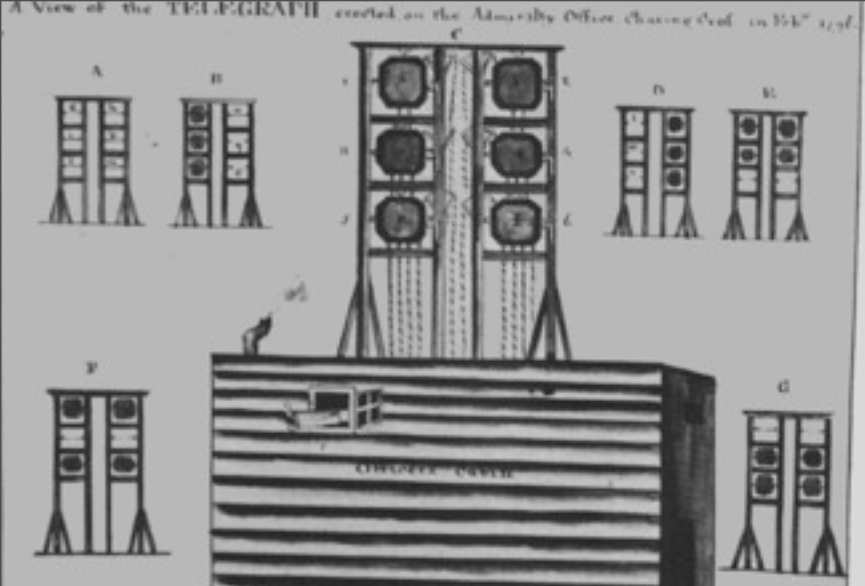
c. 6 miles apart

in service until c 1853

# interconnections







# military connections

**on land**

the Admiralty "six-shutter" telegraph

Portsmouth to London (75 miles):

*from 3 days to 15 minutes*

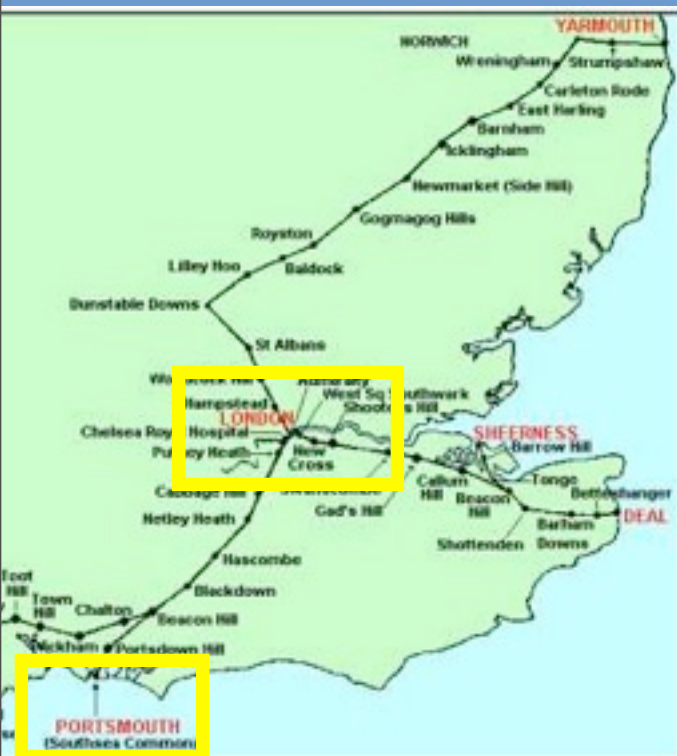
*rebuilt as a*

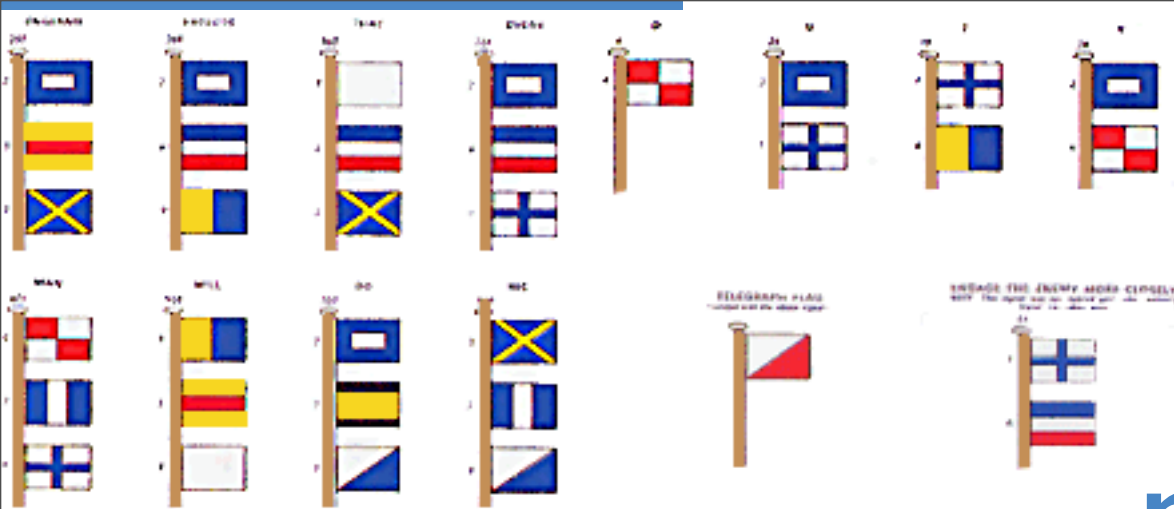
Chappe "semaphore" telegraph, 1815

"[B]y the telegraph [man] renders himself as it were present in the same moment at distant places."

*Monthly Review*

16-Hof112-CR 19





# military connections

## at sea

**1805:** "Trafalgar, a "revolutionary battle in its effects, owed its nature to revolutionary tactics; but those tactics ... were chiefly the product of a revolution in control, brought about by the innovation of Home Popham's telegraphic signalling system."

-- William Keegan, *Battle at Sea*, 1988

--Home Popham *Telegraphic Signals, or Marine Vocabulary*, 1800

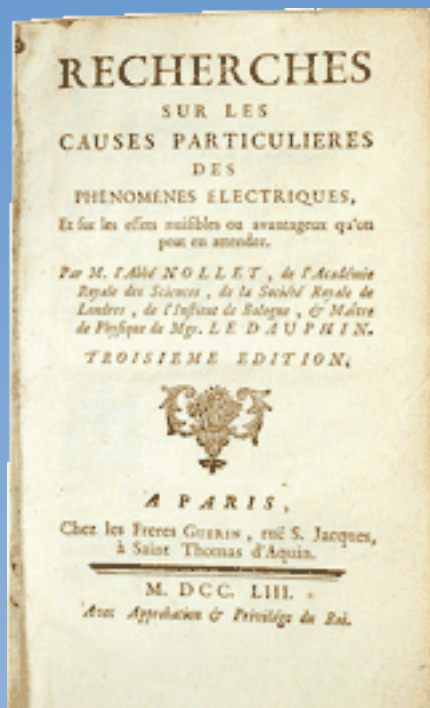


Home Popham  
1762–1820)





Abbé Nollet  
1700–1770



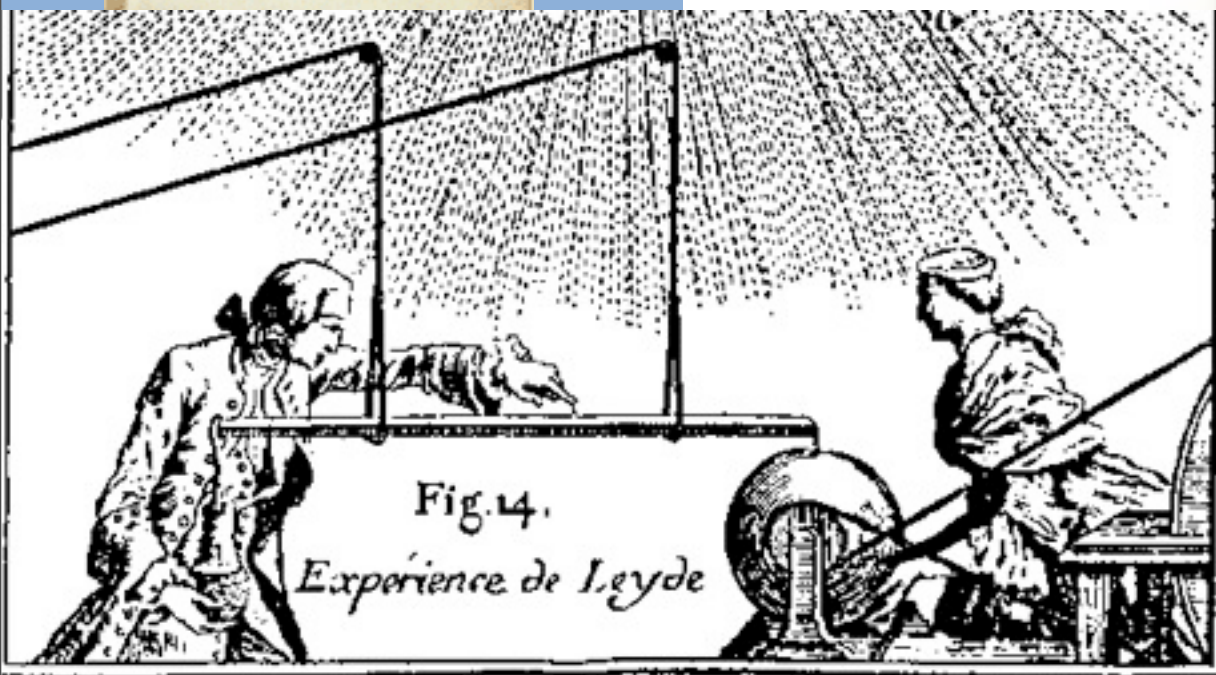
# out of sight

## monkish experiments

Abbé Nollet's galvanism

180 Royal Guards; 1 km Carthusian monks

"when a Leyden jar was discharged, the white-robed monks reportedly leapt simultaneously into the air"





# along came Morse

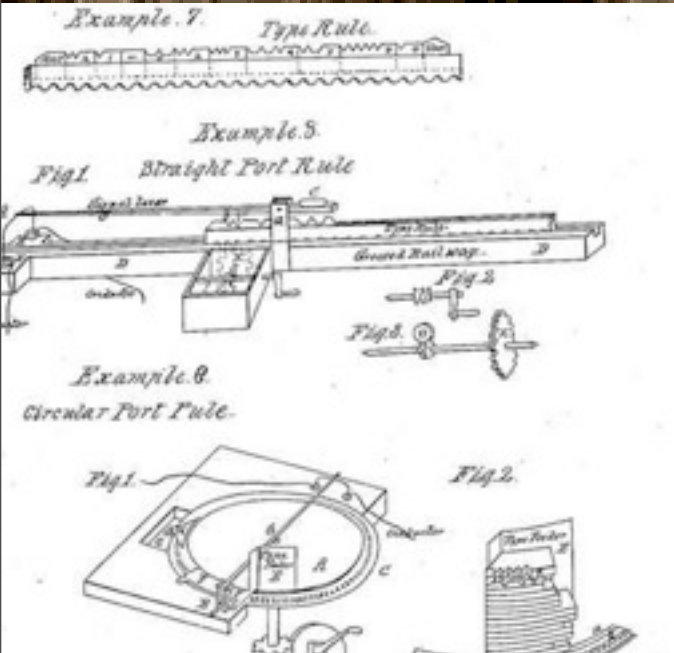
## Samuel Morse (1791-1872)

"If the presence of electricity can be made visible in any desired part of the circuit, I see no reason why intelligence may not be instantaneously transmitted by electricity to any distance."

1837, patent filing; numerical codes

1843, Washington-Baltimore line (US govt funded)

1861, transcontinental telegraph







Samuel Colt  
1814–1862

"It is evident that the system of Telegraphing news is destined to supersede in a great degree, the publication of commercial newspapers in this and other Northern cities."

--Colt & Robinson, "To the Public"

# alliances

patented revolver, 1835



Colt & Morse, 1843  
naval mine

Colt & Robinson, 1846  
New York & Offing  
Line of Magnetic Telegraph



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## NEW YORK AND OFFING LINE OF MAGNETIC TELEGRAPH.

### TO THE PUBLIC.

THE undersigned, SAMUEL COLT and WILLIAM ROBINSON, are the proprietors of the right to construct and use exclusively the ELECTRO-MAGNETIC TELEGRAPH, invented by PROFESSOR SAMUEL F. B. MORSE, from New York City, to any point or points on the shores of Long Island and New Jersey.

We have already succeeded in crossing the bed of the East River at Hurlgate with our Telegraph wires in a leaden tube, and have completed and put into successful operation a line of Telegraph as far as the lower Bay, for Commercial purposes, and deeming it of great importance to our City, not only in a commercial, but in a humane point of view, that these lines be extended, at as early a period as possible, along the entire coast of Long Island to Montauk Point, and along the New Jersey Coast, to the Capes of Delaware, making Stations and Observatories at prominent points, such as the Highlands of Neversink, Squam Beach, Barnegat and Cape May, on the New Jersey shores, at Rockaway shoals, Fire Island Inlet, and Montauk Point, on the shores of Long Island, and such other places, on both shores, where there are inlets or dangerous shoals, as may be found necessary, keeping at the several Stations suitable Life, Surf, and other Boats, for the purpose of rendering all the relief possible to vessels in distress, saving of life, property, &c.

By the aid of instantaneous communication over the Electric Telegraph to the City, not only the tales of suffering and shipwreck can be told and relief furnished sooner than by any other means, but when not thus employed, and with the aid of suitable News Boats, all vessels from Foreign ports of later dates can be boarded and news of interest and importance to the Commercial community can be sent to the city in all weathers, night and day, with the quickness of thought. With a Boating establishment properly arranged at the outer stations, an Atlantic Steamer can be boarded and all her news of importance sent over the line of Telegraph hours before it can be known in New York by any other means that she is even on our coast. A Packet Ship may often be reported days before her arrival in our harbor.

In consequence of the amount of Capital requisite to carry out the above purposes being greater than the undesignated proprietors of the Telegraph have at their disposal, they applied to the Legislature of this State and have obtained a charter for a Joint Stock Association, with \$100,000 capital, to complete said lines of Telegraph, Boating Establishment, &c., and they feel warranted in asserting, that, independent of the great relief such an association may be to the distressed voyager, a judicious employment of commercial news furnished by this means, will, at an early day, not only pay all expenses and cost of constructing the several lines, but holding, as it does, the keys of trade of the greatest commercial city on the continent, must soon pay large dividends on the stock.

The cost of constructing the lines of Telegraph in a suitable manner will amount to \$150 per mile, and can be accomplished at all the points proposed to be reached, before cold weather, if commenced at an early day. The sources of revenue to the establishment, when in full operation, will be numerous: all vessels which arrive on the coast within the limits of these lines, it is proposed to board immediately, and report the news brought by them over the line of Telegraph to this city. It is the custom for owners and consignees of vessels to pay a small premium to the person first reporting the arrival of their vessels off the Harbor; the revenue from this source, estimating the amount of shipping which arrives annually at 400,000 tons, and allowing that only one-half a cent per ton is paid, would amount to \$3,000.

The Newspaper Press of this city keep aloft, in all, five news-boats for collecting commercial news in the lower Bay, at a cost of about \$1,500 each—making, in all, \$7,500. This duty will all be done by the Telegraphic news-boats quite as correctly, and sent over the lines of Telegraph with greater despatch than by any other means.

The income from subscribers to our news-room is at present at the rate of \$10,000 per annum, and may be greatly increased when the lines are extended to more distant points. We may safely calculate upon having this amount increased to \$20,000, as every person desiring early information from abroad must become a subscriber, and consult the Books of this room.

The income from owners of Vessels and Insurance Offices for assistance rendered vessels in distress—for early information given them of such facts—for saving property from wrecks, must every year be considerable, and may amount at times to very large sums of money. Other sources of revenue, such as private communications over the line from the various stations, may be added to the above estimates; but the great and principal source from which a profit will be derived, will be the Correspondence formed with Commercial Houses and the Newspaper Press in all parts of the Union, it being contemplated to dispatch all important information in every direction where persons will subscribe and pay for it. It is evident that the system of Telegraphing news is destined to supersede, in a great degree, the publication of commercial newspapers in this and other Northern cities. Who in New Orleans, for instance, would subscribe to New York newspapers, and wait eight or ten days for the receipt of commercial news brought by an Atlantic steamer, when they can be in possession of it in as many minutes by our Telegraphic Correspondence. We beg leave to state, in this connection, that contracts have already been made for constructing a continuous line to New Orleans, and in twelve or eighteen months it will be finished and in operation.

The Offing Telegraph Association, having exclusively all the Foreign news brought to this port either by ship or steamer, can instantly dispatch the same over the other Telegraphs to every city in the Union where the lines extend.





"Some form of the word 'telegraph' appeared on the masthead of over 40 American Newspapers by 1820"  
--Richard John, *Network Nation*, 2010"

# Colt notwithstanding

New York Associated Press

James Gordon Bennett  
*New York Herald*

Moses Beach  
*New York Sun*

**consolidation:**  
Sibley's Western Union, 1855  
Gould's Western Union, 1881

James Gordon Bennett  
1795-1872



Hiram Sibley  
1807-1888



Jay Gould  
1836-1892





# ~graph to ~phone

---

**1868: duplex** (Joseph Stearns)

**qadruplex** (Thomas Edison)

**visible speech: harmonic telegraph** (Bell)

"Watson come here, I want (need) (to see) you"

"I could hear your voice plainly."

I could almost make out what you said"

# discoverer is not the best ...

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## **early uses envisaged for the telephone**

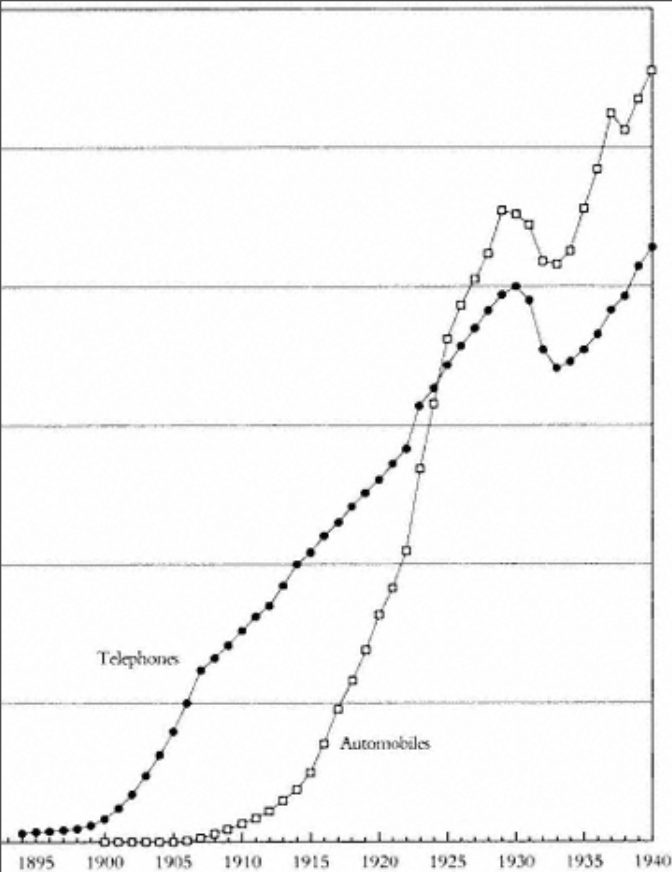
broadcasting music  
transmitting sermons  
broadcasting news  
providing wake-up calls  
conferring degrees  
telephoning in airplanes  
political ads

"When offered the Bell patents for \$100,000  
in 1876, Western Union turned them down"

-Amy Friedlander

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diffusion of telephones and cars.  
1894-1940

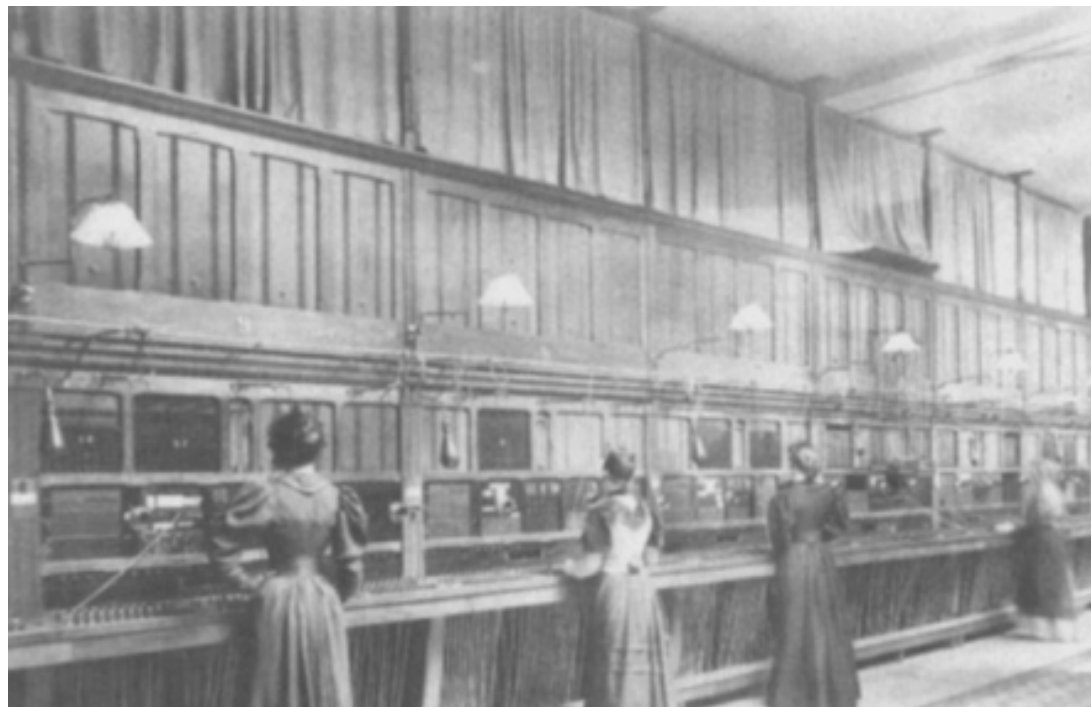
Sabin's Express System  
San Francisco, 1894

# spreading fast

## early growth - telephone

Between 1880 and 1893, growth from 60,000 to 260,000  
from 1:1,000 to 1:250 phones : people  
in 1902, roughly 300 companies

## challenge of interconnecting (1878 New Haven first exchange)



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# overview

wishing on  
technology

inventing  
inventors?

**eyewitness  
enthusiasm**

communications  
revolution

changing  
world



35th CONGRESS,  
2d Session.

[ Rep. No. 753. ]

Ho. OF REPS.

31

ELECTRO-MAGNETIC TELEGRAPHS.  
[To accompany bill H. R. No. 712.]

—  
APRIL 6, 1858.  
—

Mr. SMITH, from the Committee on Commerce, made the following  
REPORT :

*The Committee on Commerce, to whom the subject was referred, have  
had the same under consideration, and report :*

On the 3d of February, 1857, the House of Representatives passed a  
resolution requesting the Secretary of the Treasury to report to the  
House, at its present session, upon the propriety of establishing a sys-  
tem of telegraphs for the United States.  
In pursuance of this request, the Secretary of the Treasury, at an early

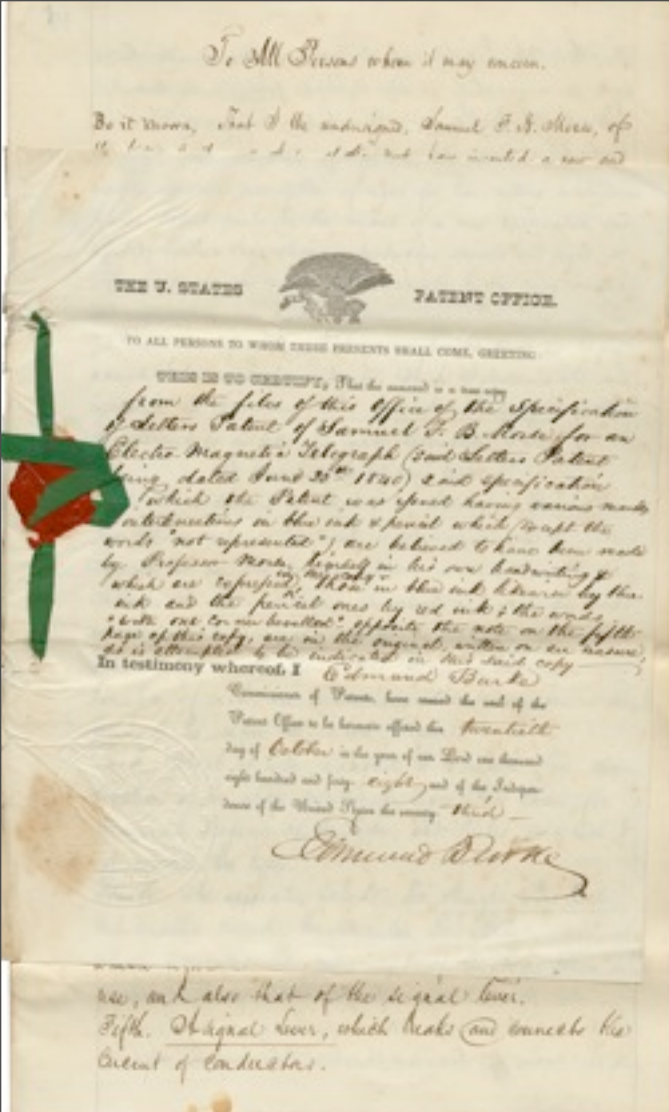
# from private enterprise to moral grandeur

---

"its great and incalculable practical  
importance and usefulness to the country,  
and ultimately to the whole world ...  
presumptuous ... to attempt ... to  
calculate ... usefulness .. political,  
commercial, or social ... it is obvious,  
however, ... a **revolution unsurpassed in  
moral grandeur by any discovery** ... to the  
present day."

Congressman "Fog" Smith,  
Chairman, House Committee on Commerce

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SGDG?

It is a matter of proud congratulation that we witness the rapid advancement of the arts and sciences on this side of the Atlantic, and to hear how frequently the skill and experience of our citizens are purchased by the wisest monarchs of Europe. The liberality with which our artisans are compensated abroad, is the highest proof of their superiority. Our manufactures are extending throughout the world. The ocean and the land alike bear testimony to American ingenuity. Praise is but a tribute due to her constitution and the laws, which extend equal rights and privileges to all.

Among the most brilliant discoveries of the age, the electro magnetic telegraph deserves a conspicuous place; destined, as it is, to change as well as hasten transmission of intelligence, and so essentially to affect the welfare of society, all that concerns its further developments will be hailed with joy.

Imagination can scarcely conceive what is now accomplished by the electric fluid, when confined and tamed, as it were, to the purposes of life. Thought has found a competitor! Nor is it less gratifying that this invention is American. To a native citizen belongs the merit of the discovery, and it is hoped that the country of his birth will reward him accordingly.

The public, at first, could scarcely believe it possible that intelligence can be sent at the rate of 188,000 miles in a second; nor that the earth would suffice for half of the current of communication; nor that currents of electricity from opposite poles would traverse the same wire at the same time,

Henry L. Ellsworth  
1791-1858

--Henry Ellsworth, commissioner of patents  
Annual Report of US Patent Office, 1844



# the great inventor

## REMINISCENCES OF MORSE

### SOME ANECDOTES OF THE GREAT INVENTOR.

HOW HE DIFFERED FROM OTHER INVENTORS  
—HIS BELIEF IN HIS PROJECTS—BURYING  
THE WIRES—HIS RETURN FROM WASH-  
INGTON—WHAT IT COST TO DEFEND HIS  
PATENT—HIS CHARITY.

It is worth while to pick up now, while it is still possible, some few anecdotes of Samuel Finley Breese Morse, the inventor of the telegraph, and to record them. Such incidents, trifling though they may be, allow us to form some slight estimate of this remarkable man. Perhaps the most salient trait that Morse had, was the positive belief in the necessity of his invention. There was no half-heartedness about him. Such men as Bernard De Palissy, are, it is true, few in this world. The French potter was willing to burn his baby's cradle, providing it would furnish fuel for heating his kiln. Putting aside as much as we may differences of age and time, Palissy seeking to perfect his dish, or Morse to develop his telegraph, the divergence between the two is wide. The former was groping for perfection in a physical thing. Men had eaten from earthen-ware, had slaked their thirst from *patere*, ever since the world was known. It behooved Palissy, perhaps, to invent new glazes, new forms, new ornaments. But with Morse it was to convince a world of a new method of imparting information, to project something which was in a certain measure ahead of them. It was a novel mental process, which was to be driven through

*New York Times*

1879

"the great inventor ... to convince the world of a new method of imparting information ... on a higher plane than that accorded to mere inventors" --*NYT*, 1879

unveiling of  
Morse's statue  
June 10, 1871



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# national aspiration

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## **revolutionary ideas**

"The establishment of the telegraph is ... the best response to the publicists who think that France is too large to form a Republic. The telegraph shortens distances and, in a way, brings an immense population together at a single point."

--Claude Chappe, 1793



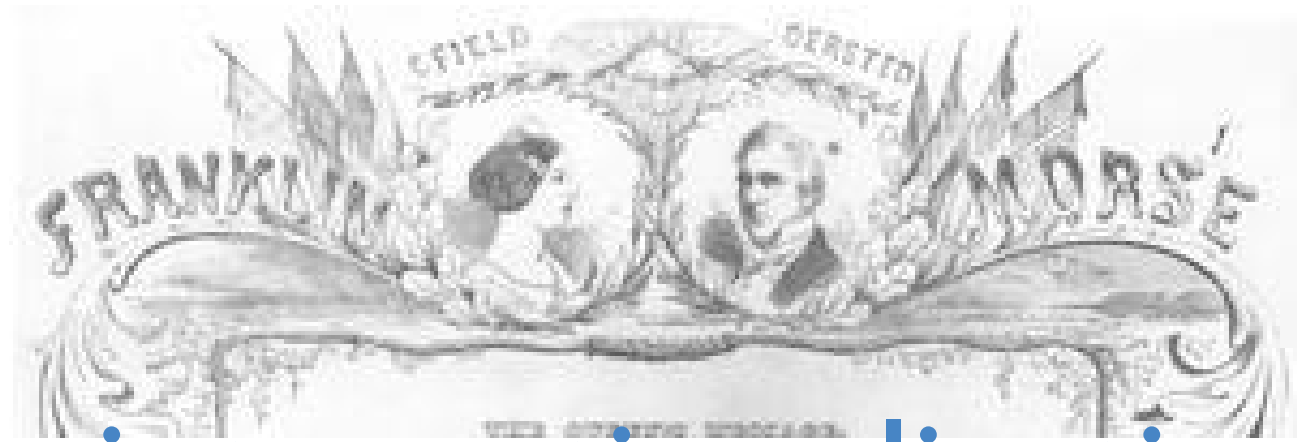
# one neighbourhood

---

"It is not visionary to suppose that it would not be long ere the whole surface of this country would be channelled for those nerves which are to diffuse, with the speed of thought, a knowledge of all that is occurring throughout the land; making one neighborhood of the while country."

Morse to Congress, 1838

THE FIRST MESSAGE.  
—  
ENGLAND GREETES AMERICA  
—  
QUEEN VICTORIA  
TO  
PRESIDENT BUCHANAN.



# internationalization

---

"May the Atlantic telegraph, under the blessing of heaven, prove to be a bond of perpetual peace and friendship between the kindred nations, and an instrument destined by Divine Providence to diffuse religion, liberty, and law throughout the world."

--President Buchanan, 1858

"Tomorrow the hearts of the civilized world will beat in a single pulse, and from that time forth forevermore the continental divisions of the earth will, in a measure, lose those conditions of time and distance which now mark their relations...The Atlantic has dried up and we become in reality as well as wish, one country." --*Times*





peace

---

"It is impossible that old prejudices and hostilities should longer exist, while such an instrument has been created for the exchange of thought between all the nations of the earth."

-- Charles Briggs & Augustus Maverick,  
*The Story of the Telegraph*, 1858

"Steam was the first olive branch offered to us by science. Then came the still more effective olive branch--this wonderful electric telegraph, which enables any man who happens to be within reach of a wire to communicate instantaneously with his fellow men all over the world."

-- Ambassador Thornton, 1858  
I6-Hof112-CR 35



## and moral progress

---

"facilitating Human Intercourse and producing Harmony  
among Men and Nations ... [I]t may be regarded as  
an important element in Moral Progress"

-- *Daily Chronicle* [Cincinnati] 1847

"the hand of progress beckons ....

a rivet is loosened from the chains of the oppressed"

--*Commercial and Financial Chronicle*, 1865.

"the great chain that will bring all civilized nations into  
instantaneous communication...the most potent of all the means of  
civilization, and the most effective in breaking down the barriers  
of evil prejudice and custom"

--*Hunt's Merchants' Magazine*, 1868

I6-Hof112-CR 36



# open to all

---

"The telegraph being alike open to *all* puts the whole community upon a par, and will thus '*head off*' the most adroit speculators, because they will not have the power to *monopolize* intelligence

*Public Ledger and Daily Transcript*  
(Philadelphia), 1846

# once again, one voice

---

"Someday we will build up a world telephone system, making necessary to all peoples the use of a common language or common understanding of languages, which will join all the people of the earth into one brotherhood. There will be heard throughout the earth a great voice coming out of the ether which will proclaim, 'Peace on earth, good will towards men.'"

--John J. Carty, AT&T, 1891



# overview

wishing on  
technology

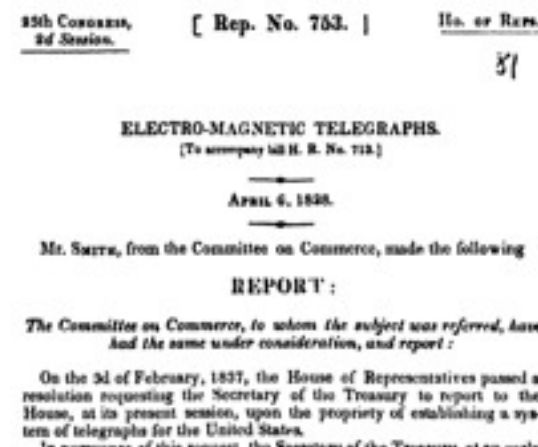
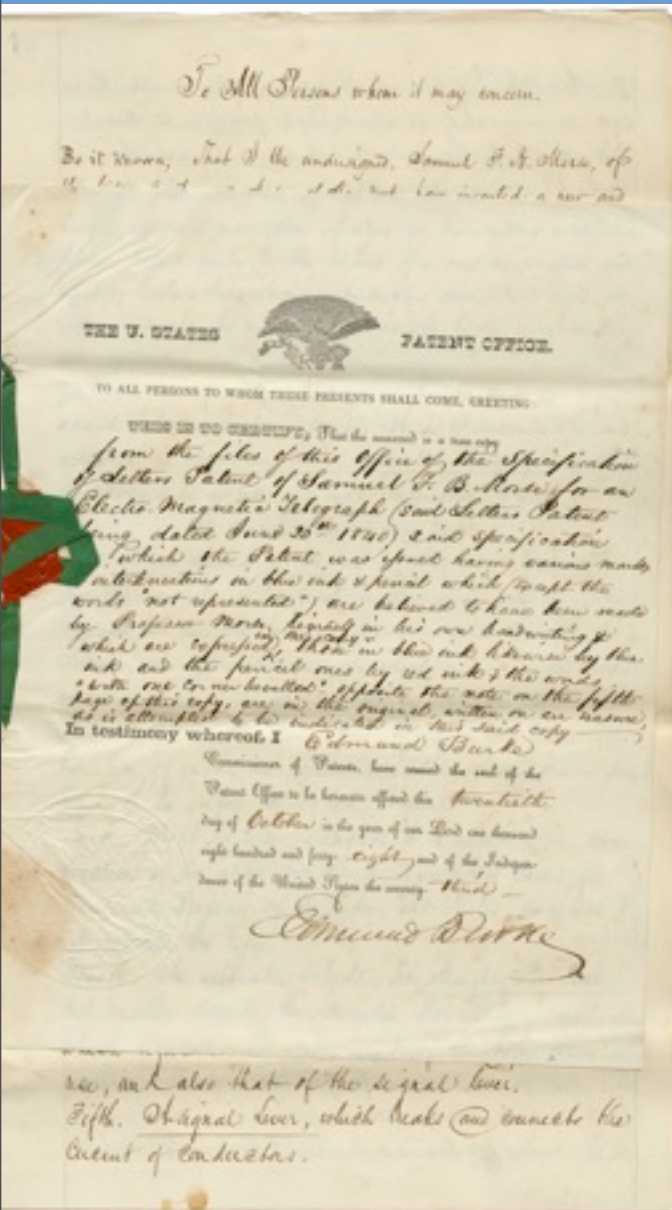
**inventing  
inventors?**

eyewitness  
enthusiasm

communications  
revolution

changing  
world

# troubling testimony



## eyewitness

"It is singular" that a series "of mechanical and scientific failures [has] given a man such a name and so proud a place in history"

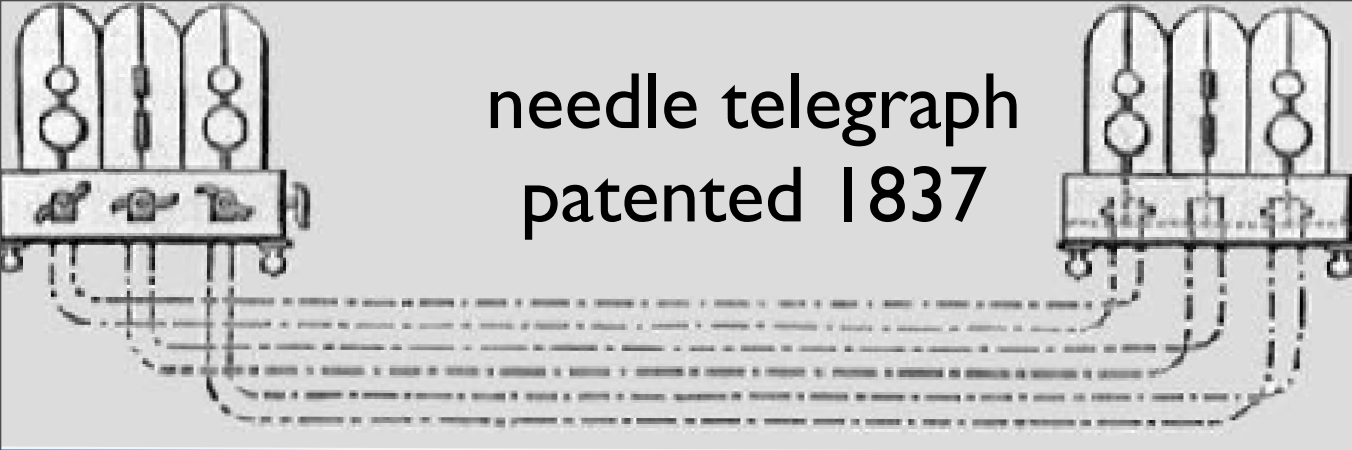
--William Baxter,

"The Real Birth of the Electric Telegraph,"

[n.d.]

16-Hof112-CR 40





needle telegraph  
patented 1837

prior art



Pavel Schilling  
1780-1836

**Carl Frederich Gauss** (1777-1855)

Gottingen observatory telegraph, 1833

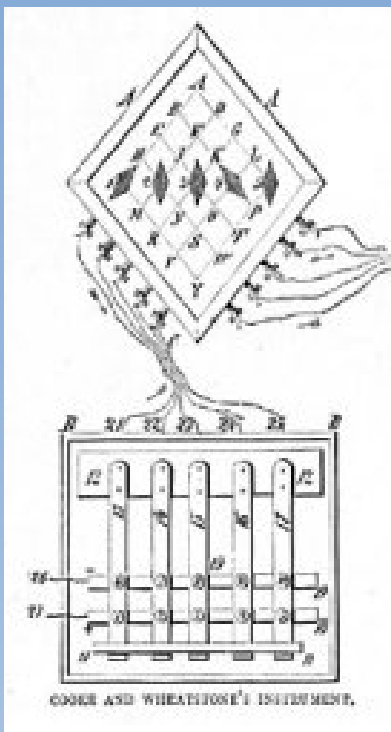
**Pavel Lvovitch Schilling** (1780-1836)

Russian Admiralty telegraph, 1835

**William Cooke** (1806-1879)

**Charles Wheatstone** (1802-1875)

GWR telegraph, 1837



# meanwhile

---

## **Harrison Dyar**

Long Island telegraph, 1827

"abandoned when threatened with prosecution  
for circulating information 'in advance of  
the mail'"

--R. John, *Network Nation*, 2010

## **Joseph Henry, 1830**





## in his own words

---

1838 Gauss--Göttingen

Manchester Birmingham Railway, Scotland

1839: England, and Germany, and France ...

1842: other systems of telegraphs on the electric plan (among which were Wheatstone's, of London, Steinheil's, of Munich, and Masson's, of Caen)

1842: Deem[ed] most fortunate that no definite system of telegraphs should hitherto have been adopted ... it enables them to establish this **improved** system



## so what did Morse do?

---

"electromagnetism ... discovered in 1820 by a Danish scientist .. the steady reliable current ... by the British chemist J. Frederick Daniell. .. Wheatstone and Cooke had installed an electrically powered signaling system ... several years before Morse ... the American chemist Harrison Gray Dyar ... workable electrical telegraph on Long Island .. 1827"

--R. John

I6-HofI12-CR 44



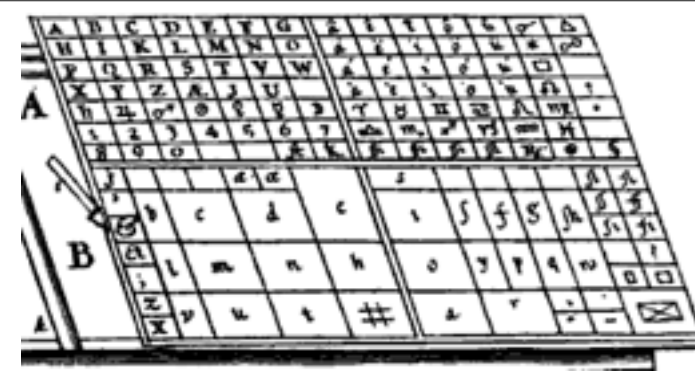
## cast your mind back

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"[Theodore]De Vinne, in his book [*The Invention of Printing*, 1789] writes, 'The inventor of printing did not invent paper .. did not originate engraving on wood. He was not the first to print upon paper, he was not the first to make printed books, it is not certain that he made the first press, it is not probable that he was the first to think of or make movable type. What he did was to invent the type mold... it was the *type mold* that the Koreans developed."

--Carter, *The Invention of Printing in China*, 1955.





# what did Morse do?

**(a) introduced a "binary" code**

Morse Code or "Vail Code"?

*The following is the alphabet for Morse's electro-magnetic telegraph:*

## ALPHABET.

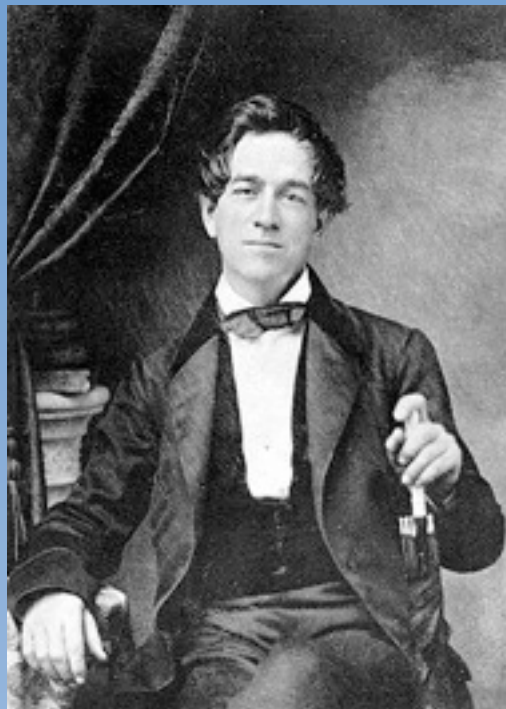
A	- -
B	- . .
C	. . .
D	- . .
E	.
F	- . .
G	- - .
H	. . . .
I	. .
K	- . .
L	- . .
M	- -
N	- .
O	. . .
P	. . . .
Q	. . . .
R	. . . .
S	. . . .
T	-
U	. . .
V	. . . .
W	- . .
X	. . .

## NUMERALS.

1	- . . .
2	. . - . .
3	. . . - .
4	. . . . -
5	- - -
6	. . . . .
7	- - . . .
8	- . . . .
9	- . . . -
0	- - - - -

"a patient waiter is no loser"

Speedwell Iron Works  
Jan 6, 1838



Alfred Vail  
1807-1859

# filing a caveat

Nº. XIX.

*An Essay tending to improve intelligible Signals, and to discover an Universal Language. From an anonymous Correspondent in France, (probably the Inventor of the Telegraph) translated from the French.*

POSSUNT QUIA POSSE VIDENTUR, Virgil.

Read June  
20, 1788.

**A**LL the delights, and conveniences of life originate in the mutual aids which men

The director of the post will only have to translate these numbers into longs (-) and briefs (v), ... to deliver this translation to the operator

*Transactions of the American Philosophical  
Society, 1799*

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(a) introduced a "binary" code

## what did Morse do?

---

**(b) reintroduced electronic signaling**

1837, 18 submissions to US govt: 17 were line of sight

**(c) introduced a simpler system**

[Wheatstone]: "a system more complicated and less efficient than the American telegraph ... the deflection of the needle became the principle upon which the savans of Europe based all their attempts ... another discovery ... by Ampère and Arago, immediately consequent on that of Oersted, namely: the electro-magnet which none of the savans of Europe ... ever thought of applying ... My telegraph is essentially based on this latter discovery." (1842)

I6-Hof112-CR 48





# "an industry shaped by law"

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## **Morse**

1837 filing; patent settled, 1854

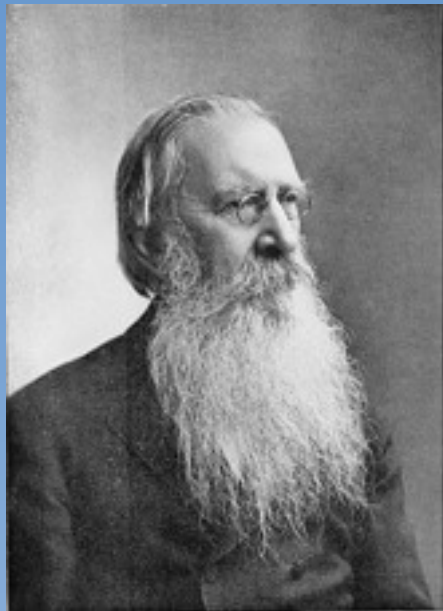
"I can't give [the figure] exactly now, but the aggregate ought to sum up something very close to \$500,000" --Morse, *NYT*, 1879

**Bell v Western Union, Gold & Stock**  
(Elisha Gray, Thomas Edison, E.A. Calahan)

18 years, 600 patent actions & 600 competing patents bought



Alexander Graham Bell  
1847–1922



Gardiner Hubbard  
1822–1997



Elisha Gray  
1835–1901

# inside job & luck?

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## **Bell, Hubbard, & Sanders**

(Bell Patent Association, Bell Telephone, AT&T)

1875, telegraph filing multiple patents

1876, Valentine's Day filing

## **Elisha Gray:**

(Western Electric)

late caveat

## **the English patent**

"part of the instrument had been screwed down  
for Atlantic crossing...."

16-Hof112-CR 50

# overview

wishing on  
technology

inventing  
inventors?

eyewitness  
enthusiasm

communications  
revolution

changing  
world



# wishing on technology

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## **wishful thinking**

love

equal access

public sphere

peace

decentralization

# love on the wires

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## **marriage over the wires**

1848: *Anecdotes of the Telegraph*

"Fujino-san and his wife met and courted via COARA, and their wedding was one of the early bonding vents of the community"

--Howard Rheingold,  
*The Virtual Community*



# How Facebook nearly destroyed our marriage

By ANTHEA GERRIE

Last updated at 12:51 AM on 25th June 2009

## divorce by wire

### a new way of knowing

"I shall never be easy till I have this Telegraph ... I shall then be acquainted with every ting, and find my Lady Curious out in all her tricks ... O what would many a man give to be informed of what is going on, when he is out of the way ... to find my Lady out, and to furnish good grounds ... to get divorced.

John Dent, *The Telegraph, or, A new way of knowing things*, 1795



# open to all

"We may safely calculate . . . . every person desiring early information from abroad must become a subscriber and consult the Books of [our news-room]"

--Colt & Robinson

## NEW YORK AND OFFING LINE OF MAGNETIC TELEGRAPH.

### TO THE PUBLIC.

THE undersigned, SAMUEL COLT and WILLIAM ROBINSON, are the proprietors of the right to construct and use exclusively the ELECTRO-MAGNETIC TELEGRAPH, invented by PROFESSOR SAMUEL F. B. MORSE, from New York City, to any point or points on the shores of Long Island and New Jersey.

We have already succeeded in crossing the bed of the East River at Hurlgate with our Telegraph wires in a leaden tube, and have completed and put into successful operation a line of Telegraph as far as the lower Bay, for Commercial purposes, and deeming it of great importance to our City, not only in a commercial, but in a humane point of view, that these lines be extended, at as early a period as possible, along the entire coast of Long Island to Montauk Point, and along the New Jersey Coast, to the Capes of Delaware, making Stations and Observatories at prominent points, such as the Highlands of Neversink, Squam Beach, Barnegat and Cape May, on the New Jersey shores, at Rockaway shoals, Fire Island Inlet, and Montauk Point, on the shores of Long Island, and such other places, on both shores, where there are inlets or dangerous shoals, as may be found necessary, keeping at the several Stations suitable Life, Surf, and other Boats, for the purpose of rendering all the relief possible to vessels in distress, saving of life, property, &c.

By the aid of instantaneous communication over the Electric Telegraph to the City, not only the tales of suffering and shipwreck can be told and relief furnished sooner than by any other means, but when not thus employed, and with the aid of suitable News Boats, all vessels from Foreign ports of later dates can be boarded and news of interest and importance to the Commercial community can be sent to the city in all weathers, night and day, with the quickness of thought. With a Boating establishment properly arranged at the outer stations, an Atlantic Steamer can be boarded and all her news of importance sent over the line of Telegraph hours before it can be known in New York by any other means that she is even on our coast. A Packet Ship may often be reported days before her arrival in our harbor.

In consequence of the amount of Capital requisite to carry out the above purposes being greater than the undersigned proprietors of the Telegraph have at their disposal, they applied to the Legislature of this State and have obtained a charter for a Joint Stock Association, with \$100,000 capital, to complete said lines of Telegraph, Boating Establishment, &c., and they feel warranted in asserting, that, independent of the great relief such an association may be to the distressed voyager, a judicious employment of commercial news furnished by this means, will, at an early day, not only pay all expenses and cost of constructing the several lines, but holding, as it does, the keys of trade of the greatest commercial city on the continent, must soon pay large dividends on the stock.

The Cost of constructing the lines of Telegraph in a suitable manner will amount to \$150 per mile, and can be completed at all the points proposed to be reached, before cold weather, if commenced at an early day. The sources of revenue to the establishment, when in full operation, will be numerous: all vessels which arrive on the coast within the limits of these lines, it is proposed to board immediately, and report the news brought by them over the line of Telegraph to this city. It is the custom for owners and consignees of vessels to pay a small premium to the parties first reporting the arrival of their vessels off the Harbor; the revenue from this source, estimating the amount of shipping which arrives annually at 800,000 tons, and allowing that only one-half a cent per ton is paid, would amount to \$3,000.

The Newspaper Press of this city keep afloat, in all, five news-boats for collecting commercial news in the Lower Bay, at a cost of about \$1,500 each—making in all \$7,500. This duty will all be done by the Telegraphic news-boats quite as correctly, and sent over the lines of Telegraph with greater despatch than by any other means.

The income from subscribers to our news-room is at present at the rate of \$10,000 per annum, and may be greatly increased when the lines are extended to more distant points. We may safely calculate upon having this amount increased to \$20,000, as every person desiring early information from abroad must become a subscriber, and consult the Books of this room.

The income from owners of Vessels and Insurance Offices for assistance rendered vessels in distress—for early information gives them of such facts—for saving property from wrecks, must every year be considerable, and may amount at times to very large sums of money; other sources of revenue, such as private communications over the line from the various stations, may be added to the above estimates; but the great and principal source from which a profit will be derived, will be the Correspondence formed with Commercial Houses and the Newspaper Press in all parts of the Union, it being contemplated to dispatch all important information in every direction where persons will subscribe and pay for it. It is evident that the system of Telegraphing news is destined to supersede, in a great degree, the publication of commercial newspapers in this and other Northern cities. Who in New Orleans, for instance, would subscribe to New York newspapers, and wait eight or ten days for the receipt of commercial news brought by an Atlantic steamer, when they can be in possession of it in as many minutes by our Telegraphic Correspondence. We beg leave to state, in this connection, that contracts have already been made for constructing a continuous line to New Orleans, and in twelve or eighteen months it will be finished and in operation.

The Offing Telegraph Association, having exclusively all the Foreign news brought to this port either by ship or steamer, can instantly dispatch the same over the other Telegraphs to every city in the Union where the lines extend—

LONDON,  
TUESDAY, FEBRUARY 22, 1814.

Never, perhaps, was greater agitation produced in the Metropolis by any foreign news, than was yesterday occasioned by a fraud of the most impudent and various description. An express arrived from Dover,

# speculative precedent



## **Admiral Cochrane**

"Napoleon is dead"

Omnium from 26-1/2 to 33

## **Stendhal**

*The Telegraph*, 1835

Thomas Cochrane  
1775–1860

# telegraph neutrality?

---

"The newspapers of California, which hardly dare notice the incorporation of a rival company, and dare not endorse a public measure of which you disapprove, are subservient enough already ... you could destroy a private business ... more completely than earthquake or conflagration could do the work the Telegraph, which has become a necessity of individual and social life, is not merely private property ... it is a great public trust to be administered for the benefit of the whole community."

Henry George, 1869



# ACCOUCHEMENT

OF

## HER MAJESTY.

### BIRTH OF A PRINCE.

"a message by electric telegraph might  
desire the landlord of the hotel to set  
a watch upon him,"

--Anthony Trollope, *The Warden*, 1855

public sphere

the level of debate

[We were enabled to give the following in a large part of our yesterday's impression :]—

*THE TIMES-OFFICE, Half-past 8 a.m.*

We have the happiness to announce that the **QUEEN** has been safely delivered of a **PRINCE**.

We are happy to state that Her Majesty is doing well.

We are indebted to the extraordinary power of the Electro-Magnetic Telegraph for the rapid communication of this important announcement.

[The following appeared in a second edition of *The Times* of yesterday :—]

**EXPRESS FROM WINDSOR.**

In addition to the intelligence of the auspicious event which we published at half-past 8 o'clock, we have just received the following

**OFFICIAL DESPATCH. [1843]**

### THE SUSPECTED MURDER AT SALT-HILL.

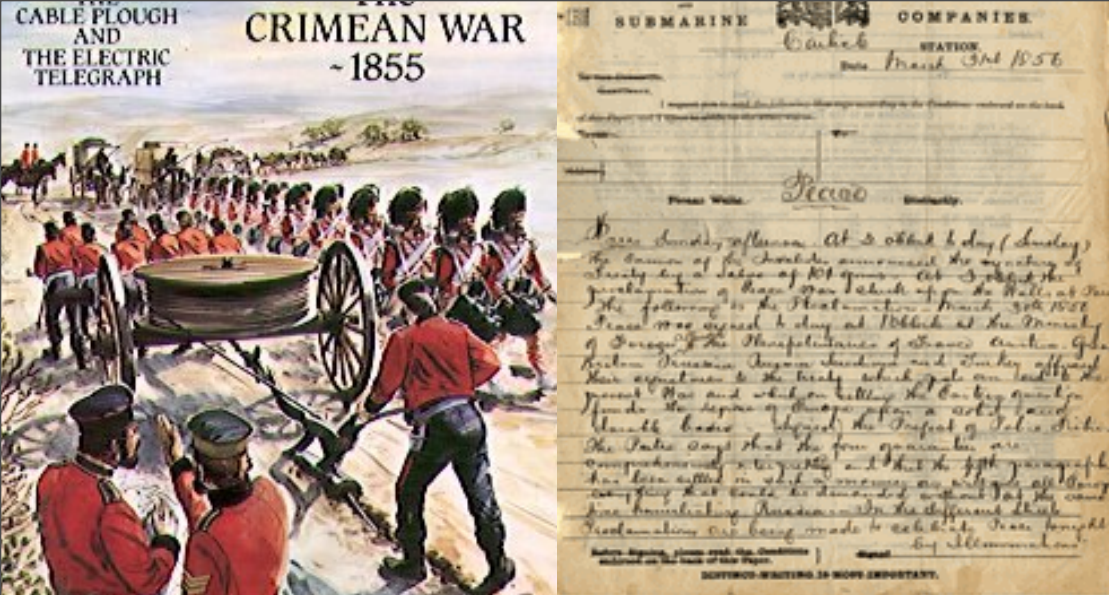
**SLOUGH, FRIDAY EVENING.**

This extraordinary affair, which is wrapt in the greatest mystery, still continues to excite the most intense interest throughout this extensive neighbourhood. A great number of persons, anxious to have a view of the interior of the house, and especially the room in which the supposed murder took place, and now containing the body of the deceased (upon which an inquest was held yesterday), visited the house during to-day; but the constable, with whom is deposited the key of the house, has received strict injunctions from the coroner, before whom the adjourned proceedings will be resumed to-morrow morning, not to suffer any one to enter the premises, and these orders have been strictly attended to.

~~The deceased had no other friends.~~

It may be observed, that had it not been for the efficient aid of the electric telegraph, both at Slough and Paddington, the greatest difficulty as well as delay would have occurred in the apprehension of the party now in custody.

[1855]



# public interest vs national interest

## Crimean War, 1855

"The steamer and the electric telegraph made the blood of England beat quicker in every heart, when our newspapers recorded, on the 13th of November, the most sanguinary and heroic battle of modern times, fought in the Crimea only a week previous."

--Charles Knight, *Knowledge is Power*, 1855

"The press and the telegraph are  
enemies we had not taken into account"

--Earl of Clarendon, British Foreign Secretary

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# decentralization?

## **military**

Clapping his glass to his sightless eye, "You know, Foley," he added, turning to his captain, "I've a right to be blind sometimes. I really do not see the signal. D—n the signal! keep mine for closer action flying."







# decentralization

## from New Jersey to New Delhi

Private line allowed managers to locate offices in relatively expensive central business districts, where face-to-face communication with bankers, suppliers, and insurance representatives was easy and frequent, and to put their sprawling factories on suburban or rural sites."

Amy Friedlander, *Natural Monopoly and Universal Service*, 1995



Otto von Bismarck  
1815-1898

(REUTER'S TELEGRAMS.)  
**DECLARATION OF WAR  
BY  
FRANCE AGAINST PRUSSIA.**

FRANCE.

PARIS, JULY 15.

The French Legislature assembled at 1 o'clock this afternoon, when a communication was simultaneously made by the Government to the Senate and the Corps Legislatif explaining the situation of affairs and terminating by a Declaration of War against Prussia. The Government announced that his declaration is precipitated by the circular of the King to the Prussian agents abroad, which, finally, confirms the affront to M. Benedetti;

Prince Leopold of Hohenzollern; and thirdly, restores to him his liberty to accept the crown of Spain. The *Constitutionnel* publishes an extraordi-

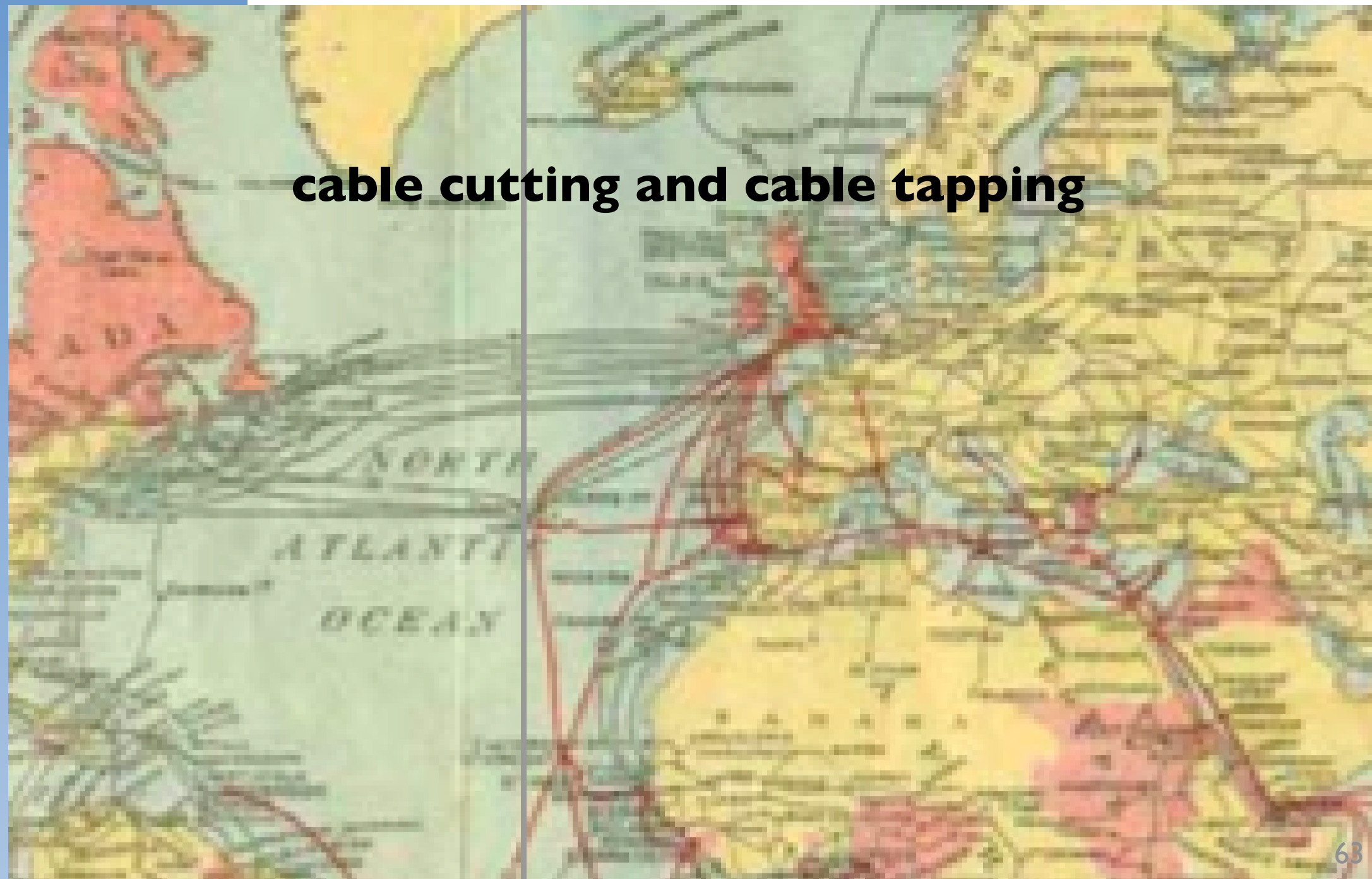
peace

## Bismarck & the Ems telegram

**His Majesty** [having told Count Benedetti that he was awaiting news from the Prince,] **has decided** [with reference to the above demand] **not to receive Count Benedetti again, but only to let him be informed through an aide-de-camp that his Majesty** [had now received from the Prince confirmation of the news which Benedetti had already received from Paris and] **had nothing further to say to the ambassador.**

"If information  
is power, whoever  
rules the world's  
telecommunication  
s system commands  
the world"  
--Peter Hugill

open to all?



**cable cutting and cable tapping**





4458 gemeinsam  
 17149 Friedensschluß.  
 14471 ©  
 6706 reichlich  
 50 finanziell  
 12224 Unterstützung  
 6929 und  
 14991 Einverständnis  
 7382 andererseits.  
 1565/7 2a/3  
 67893 Mexico.  
 14218 in  
 36477 Texas  
 5870 ①  
 17553 kein  
 67893 Mexico.  
 5870 ①  
 5454 AR  
 16102 IZ  
 15217 ON  
 22801 A

war again

## Zimmerman telegram

We intend to begin ... unrestricted submarine warfare. We shall endeavor ... to keep the United States neutral.

In the event of this not succeeding, we make Mexico a proposal of alliance on the following basis: make war together, make peace together, generous financial support and an understanding on our part that Mexico is to reconquer the lost territory in Texas, New Mexico, and Arizona.

received, Mexico, Jan 17, 1917  
 published March 1, war declared  
 April 6



4458  
17149  
14471  
6706  
50  
12224  
1424

gemeinsam  
Friedensschluß.  
©  
reichlich  
finanziell  
unterstützung  
und  
ein vrr.  
aus  
i.  
Mes  
in  
Tca  
@  
he  
Mes  
@  
AR  
12  
01  
A

war again

### ZIMMERMANN EXPLAINS.

Herr ZIMMERMANN paints what all admirers here and in Germany will consider a damning picture of the contrast between American and German methods. "Our behavior contrasts considerably with the behavior of the Washington Government," he truly says. And he explains. When he instructed the German Minister to Mexico to propose an attack on the United States by Mexico and Japan, it was done with the kindest regard for our feelings; it was done with the utmost secrecy. Washington, with a coarseness which shocks him, obtained and published the confidential instructions—"in a way that was not unobjectionable,"

## PLOT AWAKENS CONGRESS

Party Spirit Engulfed in Patriotic Zeal to Back Wilson.

### SENATE DEBATE WAXES HOT

Republicans and Democrats Assail Stone, Insisting on Asking President's Source of Facts.

FEW DETAILS DISCLOSED

## GERARD IS HONOR GUEST

Envoy Sees Cordial Relations Between Germany and U. S.

### TELEGRAM SENT TO PRESIDENT

Banqueters at Berlin Cheer Ambassador When He Tells of Good Feeling That Exists—German Officials Take Same View and Von Gwinner Calls Gerard "Peace Dove."

Berlin, Jan. 7.—"Never since the beginning of the war have the relations between Germany and the United States been as cordial as now."

# GERMAN PLOT TO LINK JAPAN AND MEXICO IN ALLIANCE OF WAR AGAINST AMERICA.



Albert Speer  
1905-1981

coming up:  
*propaganda*

## uncritical reception

---

"The telephone, the teleprinter and the wireless made it possible for orders from the highest levels to be given directly to the lowest levels, where, on account of the absolute authority behind them, they were carried out uncritically ... Former dictatorships needed collaborators of high quality even in the lower levels of leadership, men who could think and act independently. In the era of modern technique an authoritarian system can do without this ... The means of communication alone permit it to mechanise the work of subordinate leadership. As a consequence a new type develops: the uncritical recipient of orders"

--Albert Speer, Nuremberg trials.

I6-HofI12-CR 65



# competitive markets

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## **Western Union**

"the first industrial monopoly, swallowed up its last two rivals in 1866. .... [O]nly in the United States and Canada did the telegraph remain under private control after 1868"

-- Du Boff, "The Telegraph...Technology & Monopoly", 1984

# natural monopoly?

---

## **Ma Bell**

1876 Bell Telephone

1885 AT&T

1894 Bell Patents expire

1899 AT&T incorporates Bell

1910 AT&T buys Western Union

1913 Kingsbury (monopoly) Commitment

1915 AT&T San Francisco

1927 transatlantic telephone

1982 break up: the Baby Bells

# reassembly?

---

Ameritech - now AT&T

Bell Atlantic - now Verizon

Bell South - now AT&T

Pacific Telesis - now AT&T

Southwestern Bell - now AT&T

US West - independent

2011 AT&T attempts to buy Verizon, T-Mobile





# revolutions and revolutionaries



Theuth

Moses

Lord Kulaba

Ts'ai Lun

Morse

Edison

Bell

Marconi

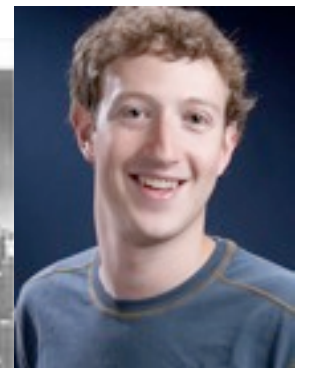
Bill Gates, Steve Jobs

**conclusion?**

problems with technologies & inventors

**remember**

users, governments, corporations, social systems



7-110112-Print 69

# coming up

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## 13 Mar: Technologies of the Image

### Required reading:

- Newhall, Beaumont. 1964. "Prints from Paper," "Portraits for the Million," and "The Faithful Witness," pp. 32-57 in *The History of Photography, From 1839 to the Present Day*. New York: Museum of Modern Art.
- Sontag, Susan. 1977. *On Photography*. New York: Farrar, Straus & Giroux. Chapter 1, "In Plato's Cave." The photographs discussed in the chapter can be found here: <http://www.gcordon.pwp.blueyonder.co.uk/chapter1.htm>

### Additional Materials:

- Green, David. "Veins of Resemblance: Photography and Eugenics," *Oxford Art Journal*, Vol. 7, No. 2, Photography (1984), pp. 3-16.