

History of Information Technology in the BC Forest Service

A story written for the Forest Service Centennial

January 2011

With minor revisions October 2011



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Introduction

What follows is a 100 year history of information technology in the forest service, from 1912 to 2012. But wait a minute!! There weren't computers way back then, so how did things get done? Sounds like something interesting to explore, and doing so gives us a backdrop to segue into how things changed when computers did come along. So, from pencils to the Internet, it was more fun looking back at the old methods of getting things done then in writing about modern computers. You will see therefore two broad themes, before computers and after computers.

And once we arrive at the era of computers, things change rather fast, so this story is chopped up into decades. The forest service does many things and has many business functions, for example, research, fire fighting, collecting revenue, enforcement, managing the forests, and gathering a forest inventory to name a few. This could have become a book to document all these functions with all the rapid technological change from the 1980s onwards. So the approach taken for this summary was to touch on enough things to give us a feel as to how computers and information technology were used in the forest service. If you don't see your specific technology, applications, or office mentioned, please accept my apologies. I had to stop somewhere. And here I thought I could summarize it all in a couple of pages!!

Links within this document

The characters (al), short for "archived link", is a link to a printed copy of a web page. As links change all the time this is one way to see what was originally at the site if the original site no longer works. Most of the other links you will see are links to static, archived material so the (al) is not needed.

1912 to 1960 – Before Computers!!

(Paper, radio, mail, maps, phones, typewriters, pencils)

Here is an excerpt from [*55 Years in the Vancouver Forest District / Coast Forest Region:*](#)

"Most of the technological change has taken place over the past 50 years or so. It is hard to believe that just 50 years ago we had no helicopters or air tankers, we had no reliable means of communication, a lot of the transport was by boat travelling at eight knots, and computers were unheard of."

Before there were computers, word processors, and the Internet, the forest service used a number of early "information technology" tools such as pencils, carbon paper, duplicating machines, and typewriters. This is a little summary of some of these tools and in some cases links to publications from back then that mentioned their use.

Some technologies that stand out are the postal service, use of radios, pencils and pens, paper, and the telephone. All of these exist to this day. Others seemed to have been phased out; the crayon used to colour maps, fluid ink pens, and ahem, carbon paper, steno pools, and typewriters.

One technology that was very important in the early years of the forest service and throughout its 100 year history is the radio. The radio was used from the earliest days. It could reach where copper phone lines had not gone yet. It could connect locations that had no phone lines or electric lines. It could connect offices, lookouts, and ranger stations.

Radio – was there at the start, still here now

From the beginning radio played an important role in the forest service. To this day, and throughout the 100 year history of the forest service, radio continues to be an important technology and one of the few technologies still with us and mostly unchanged. Well, we could count pencils and paper too.

Radio could go places that telephones could not and had more provincial coverage. Telephones needed copper wires to be strung to cities and offices. This would take some years and until that happened, radio was used for all manner of communications to cover the vast geographic extent of the province.



In the early days, radio started out mostly as [ham radio \(al\)](#), that is, amateur radio enthusiasts talking with other ham enthusiasts. In the late 1910s and 1920s, the forest service began investing in radio. The radios were double-sideband AM radios using medium to high frequency. In the late 1950s some single-sideband AM radios were used but the big transition going into the 1960s was to VHF (very high frequency) FM radios.

The importance of hams was noted in a [memo](#) from the Chief Forester dated August 22, 1924 to enlist their service when possible.

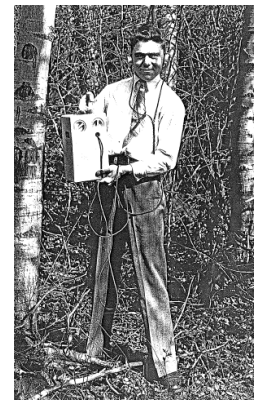
G. A. (Geoff) Playfair was the first Radio Superintendent. Geoff joined the forest service in the mid 30s, went to war, was invalided out, came home and guided the radio section into the 50s. As one example, as suitable equipment was not available the forest service designed a portable radio and it was built by Humble Manufacturing, a private sector company.

To get the most from the limited number of channels, radio became a very structured service and schedules were published to manage their use.

For example, the 1954 Prince Rupert [radio schedule](#) listed a very detailed schedule:

- ♦ beginning at 0800 hours starting first with calls to lookouts and assistant rangers located across some dozen ranger districts; then at
- ♦ 0831 a weather forecast from call sign XLV95, Smithers; then at
- ♦ 0835 fire reports from ranger stations; then at
- ♦ 1000 the Dominion Observatory Time Signal, an indication of the importance and the practice of keeping clocks and time pieces synchronized;
- ♦ scattered throughout the day were periods of Rangers' free time, for example, from 1000 to 1500 hours.

To assist staff in using one type of radio, a [Radiophone Manual](#) was published. The 1940 version of this manual outlined how to use this "lightweight and portable" radio unit for field work. The portable antenna had a fish line so you could throw the line up into a tree, or, alternatively, it suggests you could climb the tree and hoist the wire antenna up at least 8 feet, but recommends some 40 feet or more.



Their idea of “[portable](#)” is quite different compared to today’s cell phone or VHF radio.

Radiograms became an important means of communication, sort of like an early wireless memo. There was a [form](#) for a Radiogram. A person would draft a message and this message was sent verbally over the radio to other stations where it was transcribed to a Radiogram form at their end. The message was read back for verification. If need be, the same message was sent further along until all required offices had received it.

A February 1951 forest service newsletter [article](#) mentions 33,082 written messages (that would be Radiograms) were sent provincially via radio in 1951, a jump of 14,435 in one year. The same newsletter mentions the use of "walky talkies" where RCMP were in contact with a rescue crew following a crash landing of a CPA airplane on Okanagan Mountain. They also worried about the cold war. Because of our closeness to Siberia, in the event of a global war, the radio system along the coast or across the province could be shut down.

Radio was important enough that every Forest District office had radio facilities, a radio room, and radio techs, to support the radios throughout the Forest District. In addition, each Ranger District had radio facilities. A forest service newsletter dated 1952 shows [photos and staff](#) of three radio rooms – Kamloops, Nelson, and Victoria.

In 1956 the forest service started the five year switch to VHF radios from the older medium frequency radios operating between 2 and 3.5 megacycles. The older radios were subject to interference from power lines and the crowding of stations on the same channel or channels on either side. For more information, refer to the [Forest Service Newsletter, December, 1956](#).

By 1960, the portable radio under the dash as we may know it today came along. Also in the 60s the Telex teletype service was introduced and FS radios across the province “moved big time to VHF”. By the 70s it became less common to transcribe all radio calls.

In 1975 the forest service had 50 repeaters. By 1987 the radio stats were 2,000 mobiles, 3,000 portables, 300 base stations, and 212 repeaters in service ([al](#)).

By October 2000, the ministry operated, managed and maintained the largest government radio system in Canada. It includes more than 320 mountain top repeaters, approximately 500 base stations, 6000-7000 pieces of wireless and radio communications equipment, weather stations, an aircraft (resource) tracking system and a variety of other unique wireless and radio communication systems. By 2010, there were 329 repeater sites. Source *MOF IRM Plan Oct 2000* ([al](#)).

Today, the radio network is primarily used for the fire protection, compliance and enforcement programs, and for the safety of field staff. For more information refer to the [FS Radio Overview](#) ([al](#)) and the [FS Radio website](#) ([al](#)) both available from the forest service website.

Life in the radio section – An excerpt from “55 Years....”

Below is an excerpt about the radio section from [55 Years in the Vancouver Forest District / Coast Forest Region](#):

“It is hard to believe in the present age of instant communication that communications in 1950 and for many years after were limited in the extreme. In many areas, conventional telephone communication either did not exist, or was sporadic at best. Communication was limited to AM radio, which could also be

rather temperamental. Each Ranger Headquarters and major Forest Service vessel was equipped with an AM radio. Communication between the headquarters office and the Ranger offices was either by mail or by radio. Messages sent by radio were called Radiograms and were formally numbered and logged.

“One feature of the time was the daily “Launch Sched.” Each working day at 8:30 AM and 4:30 PM the radio operators at the Vancouver headquarters would call each active vessel and determine its location and current situation. The conversation would go as follows:

- ◆ VYNK the Maple, this is XLU42 Vancouver—what is your position?
- ◆ XLU42 Vancouver, this is VYNK the Maple we are in Johnstone Strait enroute Campbell River and no traffic.

“If a vessel was docked at its headquarters, the Ranger Station dispatcher would respond and advise Vancouver that the vessel was in dock. This was the primary safety check-in and if one of the launches did not respond it became a major safety issue. The Coast Guard was notified and an all-out search would begin.

“For many years, the Vancouver radio communications centre was located next to the Vancouver Forest District warehouse on the Fraser River beside the Forest Service Marine Station. Some of the long-term radio operators were Alex Ferguson, Les Matthews, Gordon Ferguson, and Bill Kyme. Gordon Ferguson was noted for having an unbelievable memory for voices. Once Gordon got to know your voice, he could identify you immediately even after a break of several years. There was also a succession of radio technicians over the years, including Y.D. Lee, Tom Ballantyne, and Ian Crosby.”

War Declared Over the FS Radio

David Ford, a retired forest service employee, provided this story written by his uncle Ken Ford. The 2LO referred to below is the BBC service out of London, “London Calling”, quite famous in those days.

“In June of 1939 an appointment as Assistant Engineer on the B.C.-Alaska Highway Commission took me to Vancouver, where I reported to E.C.W. Lamarque, D.L.S., formally of the Hudson Bay Company and a distinguished artist. He was in charge of the Alaska Highway survey party from Lower Post, B.C., located on the Liard River and on the northern boundary of British Columbia, to Sifton Pass, in the Rocky Mountain Trench at the headwaters of the Kechika River and Fox Creek, between the Liard and Finlay watersheds.

Among our chores was contact with the outside world. We used a standard radio (long and short wave) and a B.C. Forestry field set, call letters BCFS84. We listened on a regular schedule in the evening.

The long wave on the radio was out of order, but we could pick up 2LO in London, England on the short wave when the atmospherics permitted. I would pick up the news and pass it on to the party coming north to meet us. In 1939 the world situation was becoming tense with Chamberlain and his umbrella and Britain involved in war activities.

One night just as I began listening I heard the words “Canada declares war...” then the broadcast moved on to other items. I passed the word on. Apparently a

number of trappers, etc. of that part of northern Canada heard my broadcast and started immediately for Prince George. I started back there myself the next day.

When I got to Prince George I went to the barber as I needed a shave. I had run out of blades some time back. While there the broadcaster from the local radio station came to congratulate me for having declared war two days earlier than MacKenzie King!"

Mail – the Postal Service and Interoffice mail

Mail has always been an important tool of the forest service. There were two types of mail, the mail that was sent through the Canadian Postal Service, and the mail that was sent internally within the forest service usually called interoffice mail. In today's terms, 2011, we would call that snail mail but in those days mail was the major means of doing business both internally and externally with the forest industry and the public.

A letter in the Radio Shops archives sent via the postal service in 1948 has as its address "Chief Forester, Victoria, B.C." and the return address as "Return to District Forester at point of mailing". It was postmarked Vancouver and had a 4 cent stamp. Interesting that the addresses didn't have to be any longer than that back then!!

As for internal mail, one would write the name of the person and their office name on an envelope or speedy memo. Re-usable interoffice envelopes were often used. Also one could use a "Routing Slip" and write down a person's name and check off one of the boxes indicating the "office" the internal mail had to go to. If it needed to be routed to many people, then you would check off a number of names on the routing slip and each person would cross out their name after they had dealt with it.

Another item that went along with paper mail was the in/out basket. Nearly every person had one on their desk and one would work diligently to try to keep up with the incomings but never really succeeded!!

Manuals

An organization cannot function without manuals, right? The ministry had pre-printed manuals early on.

As one example, a pre-printed field guide called *Instructions for Forest Surveys*, first published 1921 and revised January 1925 was available for field staff. The manual mentions "All colouring on Forest Cover maps will be made with standard crayons" and, on the next line, "When a renewal of a crayon is desired, requisition by the number on the crayon". On another page the "Standard Legend for Forest Cover Map" lists "Faber Crayon Number 6628 Dark Green" for "Merchantable timber 10 M. and over per ac. E. of Cascade Mts" or "20 M. and over per ac. W. of Cascade Mts". Perhaps easier to read is "6613 Brown" for "Cultivated land" or "6605 Sky Blue" for "Swamp". Here is [a sample of the 1925 manual](#).

This *Instructions for Forest Surveys* guide continues to be interesting in that it provides insight into a few other things about "life before computers". For example, under "Appendix No. 2." it lists things like "Equipment" needed, such as tents and chains (chains were used for measuring distance, 100 links being 66 feet), and under "Office and Stationery" it lists items such as:

- ♦ carbon paper – so we know they were using it then;

- ◆ forms, with form numbers such as “Traverse sheet, 345”, “Tally-sheets, 109 or 109a”, and “Fire time-book, 73”. Some of these, the FS345 and FS73, still exist today. Gees, almost 100-year-old forms;
- ◆ map-sheets, paper and celluloid;
- ◆ artgum, erasers, blotters, elastic bands, paper-clips, paper-staples;
- ◆ pencils, and various pens – ruling, writing, crow-quill, and speed lettering.

And it continues with a list “Per Horse”, which includes for example, a Pack-saddle, Hobbles, and a Nose-bag; a list “Per Pack-Train”; and even a “Provision List for a Party of Ten for One Month”. This list includes items like 125 lb. Swift’s bacon, 50 lb. butter, 200 lb. white flour, and 96 tins of Borden’s evaporated milk.

Examples of some other manuals the forest service used are the *Management Manual* and the *Operations Manual*. Interestingly (well perhaps) both are mentioned in a 1931 circular letter. See more below.

Policy by Circular Letters (perhaps some things never change)

The forest service had what were called “Circular Letters”, which were memos that pertained to policy and procedure and signed by executive management such as the Chief Forester. The first page was typed on pre-printed letter head and subsequent pages on plain paper. The office would do what was requested in the letter and file each circular letter into a binder and store this within the office for reference.

It is interesting to note that a [1931 circular letter](#) mentions to cancel all the “A” series of Circulars to-date as they became obsolete by two newly introduced manuals: the *Management Manual* and the *Operations Manual*. So here is some evidence of manuals replacing the Circular Letter process. It’s also interesting to note the file numbers mentioned on the letters – an indication of the early paper filing system.

For more examples of Circular Letters see [Letters from 1931-1942](#) or [Letters from 1923 - 1931](#) each of which contain dozens of circular letters from the date range indicated.

Pencils!!

Click on the following to see this interesting [February 1931 memo about pencils](#). From today’s perspective this looks much like the policy later in the 1980s about microcomputers and who should get them to do what and how often!! For example, this circular letter says you could have one “[Eversharp](#)” ([al](#)) mechanical pencil, and if necessary an additional two ordinary lead pencils per year, or optionally, you could have six ordinary lead pencils of desired hardness annually but no Eversharp mechanical pencil. From this, it looks like we can say that pencils were an early technology that needed management.

Promise Cards – How did we keep track of those back then?

Promise cards were used by each office to keep track of things. A [circular letter dated March 1931](#) explains the “Follow Up System” by stating that for every request or promise made in a letter, a promise card, which used ordinary paper index card stock, is to be entered and filed in the promise card box under the date of fulfillment. It is interesting to note that this manual promise card tracking system mentioned back in 1931 was among the first corporate applications developed in the early 1990s for the new tenure system. It was called Work/Events. Prior to this, in the 1980s, various microcomputer tools, such

as spreadsheets or dBase, were used by districts to help support promise card tracking. Anything was easier than manually thumbing through a set of index cards.

Records

The forest service, like most organizations, has a need to keep records. A circular letter titled [Circular Re Filing in District Offices](#), dated April 13, 1931 outlines the challenges (it actually says chaos) of record keeping and the need for consistent file conventions and methods across districts.

The circular introduces letter conventions based upon “divisions of the Forest Branch”: G for Grazing; M for Management; O for Operations and R for Records. It is interesting to note that records were a division of the Forest Branch. It further outlines how letters and correspondence are to be filed.

Also mentioned, in capitals, is that “ALL DICTATING OFFICERS AND ALL STENOGRAPHERS FAMILIER THEMSELVES” with the classifications and adhere to these practices. Perhaps some things never change as this sounds much like today’s challenge of getting staff to learn the current classification system and how to use the electronic records systems of today. The classifications mentioned above was a precursor to the current [ARCS and ORCS \(al\)](#) filing conventions.

Forms and templates

Interestingly, forms appear early in the life of the forest service. As mentioned previously above, the *Instructions for Forest Surveys*, first published in 1921, mentions forms and form numbers such as: “Traverse sheet, 345”, “Tally-sheets, 109 or 109a”, and “Fire time-book, 73”. Some of these, the FS345 and FS73, still exist today.

Here are some other examples:

- ◆ A lease form is mentioned in [circular letter dated October 21, 1924](#). It includes as attachments a pre-printed “for witness” form of the “fill-in-the-blanks” style. The lease form looks typewritten and appears like a template, that is, the words to use for the standard lease.
- ◆ Forms with a form number are mentioned in a [circular letter dated April 23, 1925](#) regarding the “Launch Fuel Report” form # 135. The circular advises staff on how to correctly fill in the hours and miles on the form.
- ◆ A [campfire permit form is mentioned March 29, 1927](#). It states that every government office be authorized to issue the permit and that the form “is to be of the simplest possible and it is proposed that the permittee shall fill in the necessary information himself so that the issuing officer merely has to sign”.
- ◆ A form D 102 “Notice of Change of Appointment”, 1949, is mentioned [in circular letter no. 2088](#). It has a sample of the form and how to fill it in. Of interest, it shows how to x out on the typewriter the parts of the form that are not applicable.
- ◆ Appropriate use. [Circular dated December 6, 1927](#) mentions that government cars, launches, etc are only to be used for departmental business. The draft of the “A” circular is typewritten on a pre-printed “Memorandum” form. Interesting to know the pre-printed memo was in use back then.
- ◆ [Survey forms](#), circa 1920s, with numbers FB 118, FB 109A, FB 110A look hand-drawn. Included is a photo of Mickey Pogue near Hoover Lake, in the Nehaliston

area, standing on the top of Poison Butte in 1928. Note the "FB" form numbering scheme (for Forest Branch) rather than today's "FS" number scheme (for forest service).

The In/Out Basket

Hey, remember these? A main feature on most desks was the in/out basket. One would get stacks of paper in the in-basket and routinely try to sort through it to do the most important things. When done, things went into the out-basket. Someone would come around and drop off new stuff and pick up the outgoing stuff. One recalls if the item was really important it would have 2 rush stickers and 3 urgent stickers on it. Hey, line up with the other rush-rush, urgent-urgent-urgents!!

By the mid 1990s, paper in/out baskets were largely gone, replaced by, you guessed it, email. Now the email has important and urgent flags on it!!

Telegrams, Telegraph, Teletype

There is a [circular letter](#) dated February 1931 about telegrams and how to save money. It states that the telegram should bear the name only of the person who dictates them and not both the title and the name, otherwise a telegraph of 10 words gets charged to the department as 12 words.

John Flanagan, currently with Wildfire Management Branch, mentioned that in the 1930s the Chief Forester could send a telegraph to district foresters (ranger stations). The draft of the telegraph was taken to the Victoria telegraph office, sent to major cities, for example Kamloops, and then delivered the rest of the way via mail.

Phones

Of course, the telephone became a mainstay of communications and still is. Telephones were first installed in BC in 1878 at two different locations on Vancouver Island. From these modest beginnings, a new industry emerged. In 1880, the Victoria and Esquimalt Telephone Company was established - BC's first. By the turn of the century, there were as many as 45 small phone companies in BC.



Title: Bc Telephone Co Operations at Victoria.

In 1904 the Victoria & Esquimalt Telephone Company and the New Westminster & Burrard Inlet Telephone Company were taken over by The Vernon & Nelson Telephone Company. On July 5, 1904 the name of the company was changed to the British Columbia Telephone Company Limited.

On the first of April 1929, a charter was obtained for a new company under BC Telephone to be called "North West Telephone Company". This company was created to experiment with Radio-Telephony as a method to serve areas of

the province otherwise unreachable by wire. The first experiment was to provide a connection to Powell River from Campbell River, 50 miles across the water. The "North

West Telephone Company" was officially merged into the BC Telephone Company on January 1, 1961.

Eventually, the BC government established a central agency to coordinate and manage phone services for all provincial government offices called ProvNet which continues to this day. (Sources: [BCTel](#) and [Wikipedia](#)).

Expensive long distance phone calls are mentioned in a [May 1938 circular letter](#) and, to save money, avoid them if possible "with a little forethought".

Holly Frederickson recalls being a switchboard operator in the 70s (like you see in the photo above). She would manually patch through long distance calls and a good operator could keep 8 lines going. John Flanagan remembers magneto phones in forest districts. John says districts went to touch tone phones in 1983. Also regions, but never districts, had teletypes and punch tape. David Miller says the Magneto phone was quite common, even up to the 1980s. He recalls party lines and Northwest Tel putting in copper lines and phones to ranger districts (precursor to forest districts). In Victoria in the 1980s it was common for staff to have a phone at their desk.

Here is a story from Holly, mentioned above, about "*Being A Telephone Operator On A Cord Board System.*"

"Operators wore the headsets you see in photographs and they plugged into the "board" as they started their shift. Each position had about eight pairs of cords that were used to "pick up calls". When a customer dialed "0" a bulb would light up on a strip directly in front of the operator (much like a Christmas light going on) who was sitting ready with the back cord in hand. The operator would plug into the hole beside the light. The strips were categorized by areas - so for Victoria there were exchanges like the 38X series, Oak Bay 592 or 598, Sooke 642, Port Renfrew 647, etc.

"The front cord of the pair was used to connect the customer on their call. This could be a local call if they were experiencing trouble or a long distance call, emergency services, etc. The operator keyed in the telephone number (in the really "old" days they would have dialed that number on a rotary system). Operators stayed on the line to announce the call if it was a collect call, or to ask for a specific person if it was person-to-person, or collect coins if it was a payphone call, etc. The payphones were always identified on a separate strip and some operators hated answering those calls as it likely meant the customers would pay by coins. Operators were trained to identify what the three coin sounds were (nickels, dimes and quarters).

"All chargeable calls required the operator to fill out a manual ticket and a good operator filled in the bubbles cleanly (like filling in a multiple choice exam or a voting ballot). As technology advanced, the tickets when read by a computer and tickets would be rejected if they were too untidy. The mechanical pencils used special lead and operators also spent time refilling the pencils. Each operator had their own identification number so you knew who had filled out a ticket and what volumes of calls you were producing.

"The ticket was stamped on at a time clock (one per station) and then stamped off when the call ended. A call ended when the light beside the pair of cords went red indicating someone had hung up. A really good operator could fill their entire station of eight sets of cords and then plug into the adjoining station and take other calls. If you were right handed you typically sat with the clock to your

right so working both stations meant you had to master stamping tickets on and off with your left hand as well. Often calls would start ending the same time and there would be a flurry of activity as the operator was stamping tickets and releasing cords. The operator had to "pull the plug" to release the connection with the customer so they could have a dial tone and use their telephone again.

“Operators then had to add up the charges for each call by the number of minutes - the difference between start/finish time and complete the billing details. Toll charges and all kinds of pertinent information was provided in an indexed holder at each station (updated daily). If it was a hotel where the caller was at, the hotel was called with Time & Charges (who called, room number, where they called, how long they spoke, charges). Tickets were collected each half hour by a supervisor. An operator also tallied the volumes of calls with a clicker as not all calls required a ticket (for example questions like, what's the area code for ?). Reports were used - number of tickets and volumes of calls answered - to determine call volume patterns so there could be enough staff working or call in additional staff. Lots of planning and yet one could never predict catastrophes, weather challenges, and times when call volume was up unexpectedly.”

See BC Archives for photos:

- ◆ [BC Telephone Operations, Victoria, 1951](#)
- ◆ [BC Telephone Switchboard Operator, Victoria, 1941](#)
- ◆ [BC Telephone Switchboard, Port Alberni, 191-](#)

FAX

FAX machines became quite common in the 1980s and 1990s and all offices had at least one. Early fax machines were thermal printers, meaning they printed on special fax paper that had a heat sensitive coating. These faxes usually faded over time. Plain paper fax machines came along to replace them, either the thermal transfer kind, which had a wide black ribbon that transferred the image to plain paper, or the laser printer type, typically part of a multi-function copier or printer.

Making copies and duplicating before photocopiers

Before photocopiers existed the process to make a copy was a tad more difficult. Some devices used to make copies back then included:

- ◆ Offset printing at the Queen's Printer for large numbers of copies for things like corporate manuals and reports;
- ◆ Carbon paper for smaller numbers of copies for things like letters;
- ◆ Multi-part forms and memos with carbon paper between sheets, and later, carbon-less multi-part forms and memos;
- ◆ Gestetner, or the ditto machine, which brings back the childhood memory of the smell of school tests, and mimeograph machines. Here are some links to further descriptions: the ["blue smelly" copy](#) we may recall; the [mimeograph](#), [David Gestetner](#), and [Duplicating machines](#).

When the [photocopier](#) came along in the 1960s, to make a copy was often referred to as Xeroxing and a copy would often be referred to as a Xerox. This was because the Xerox Corporation was the company who pioneered the electrostatic photocopy machine.

Scaling License

Prior to the advent of computers the ministry issued permits and licenses and had to do it the old fashion way.

For example, in 1928 the Forest Branch, as the forest service was known then, of the Department of Lands issued a Scaling License. A memo was typed using a typewriter on pre-printed letterhead. Attached to the memo was the license document which was created using a pre-printed form that was filled-in with handwriting. Maybe they had it easier back then!

Click here to see a copy of the [Scaling License Document 1928](#).

Fire Protection

Prior to the formation of the Forest Branch in 1912, fire protection was one section in the Department of Lands. With an inadequate and ill-trained group of seasonal fire fighters and a minimal budget, the section struggled to contain and control fires in the Province. In many cases, their task was impossible since access to remote areas and communications systems were almost non-existent. In 1912, an initial task for the newly formed Forest Branch was to set up more ranger districts and to provide access and communications so vital to an effective fire protection programme.

In the early years of the Forest Branch, the emphasis of protection work was on an expanding ground force. At the same time, efforts were being made to expand and improve access through the extension of roads and communications systems through the development of a network of telephones and radios.

In 1920, the Marconi Company won a contract to develop a wireless radio for the forest service. In a few short years, it proved an invaluable investment for the protection forces.

Gradually, there was a shift from response to emergencies to a predictive approach to forest protection. A growing network of look-out towers provided the means to scan vast areas and pinpoint fire trouble spots. Aerial surveillance, developed after WWI, was used to augment the lookouts' work in tracking storms and pinpointing fire sites. Coupled with a more effective communications and transportation network, response was speeded up and ground crews shuttled quickly to fires.

1958 saw the use of air tankers to support fire-fighting. And in the 1980s, prediction capability was increased by the introduction of computerized lightning location, weather and fire suppression systems.

(Reference, Doug Adderley, 1979, [Protection Theme Paper](#))

Maps

The forest service is a land based activity and maps have always been important to its operation. The evolution of maps in the ministry could be summarized briefly as: from linen, paper, and mylar based map sheets that were hand drafted with pencil, pen, or crayon; to computer assisted drafting and mapping tools; and finally, to spatial databases and geographic information systems shared across government, public and the forest industry.

Before computers, all maps were done by hand, and in the case of colour, standard crayons were used (see more under the section above called Manuals, there is mentioned the guide called, *Instructions for Forest Surveys*).

In the late 1990s, many old paper maps were scanned. Examples of some old maps are below:

- ◆ Here is an example of a [1954 TFL 18 document](#), the last page is a map
- ◆ Here is an example of a [1962 TFL 14 document](#), the last page is a map
- ◆ Here is an example of a [1981 forest cover map for TFL 13](#). This one is small at some .4mb.
- ◆ Here is another example of a [1981 forest cover map for TFL 13](#). This one is **LARGE** at some **38mb!!**

Forest Inventory

In 1917, the first comprehensive inventory of British Columbia's forest resources was published. It was titled *Forest Resources in British Columbia* and was the first attempt to classify the extent and type of forest in the province. After re-establishing activities and increasing Forest Branch personnel following WWI, reductions were once again the order of the day as the impact of the Depression was felt in British Columbia. Nonetheless, the second province-wide inventory which was initiated in 1927 was continued through the worst years of the Depression finally concluding in 1935. The resulting report published in 1937 was F.D. Mulholland's *The Forest Resources of British Columbia*. Like its predecessor of 1917, it remained the only up-to-date reference tool on forest resources in British Columbia for another twenty years.

In 1937, the Forest Branch took the initial step that would eventually see the Inventory Branch as an automated activity dominated by computers; they began in that year to use the Hollerith punch card system of recording forest inventory data.

In 1957, the use of punch cards and computers increased. Computer use increased through the 1960s beginning with the LGP-30 ([picture](#)), a 740 pound “desktop” computer, and moving through the IBM 650, the IBM 1620, and the third generation IBM 360. Additional sophisticated equipment included, in 1970, the Xerox 1860 printer/reducer and in 1973, the zeiss Jena Topocart B plotter and the Model 5305 Gradison Digitizer. Ultimately in 1977, the Division acquired a computerized mapping system, the Interactive Graphics Design System, or IGDS, which became operational the following year.

The Hollerith system was patented in 1889. It pre-dated modern computers and initially was used in mechanical tabulating and sorting machines. IBM came out with their 80 byte version of the punch card in 1928.

Click here for more information about [punch cards](#) ([al](#)) and [early computers](#) ([al](#)) that used them.

(Reference, Doug Adderley, 1979, [Inventory Theme Paper](#))

The 1960s – Computers pick up some steam (the backroom, mainframes, punch cards, batch processing)

The IBM 1440 in Vancouver

Victor programmable calculators were used in regions in the mid-seventies for stumpage rate calculations recalls Greg Grove-White, a former Valuation Branch staffer. But changes were afoot!!

In 1966, the Vancouver Forest District, which at the time had the largest volume of logs to be scaled within the province, began using an IBM 1440 computer. It had 8k memory, 5mb disks, and, while it could add and subtract it had no hardware multiply and divide – it had to be programmed. The computer, printers, and data storage were located in their Vancouver office.

The paper scale data came into the office and 24 data entry operators keypunched this onto IBM 80 byte paper punch cards. The data was then key verified by other key punch operators. The data was so complicated that the usual key punch rate of 12,000 strokes per hour was instead 4,500 strokes per hour.

The completed tally sheet punch cards were then fed into the IBM 1440 via the punch card reader. Stored information on the 1440 computer such as marks, owner, operator, species, grade, and rates was then used to edit and process the tally sheet input. The computer made all the computations on scales and values before printing an 8-part S & R form at the rate of 100 completed every 75 minutes. The information was stored so that monthly summaries could be produced. If there were edit errors, the S & R was printed with the error messages so they could be corrected.

The printed S & R account went to four staff in the sorting and mailing section where they sent the original and up to three yellow copies to the broker or vendor and distributed the green, pink, blue, and orange copies internally as required. If any additional copies were required they were made on the Xerox copier.

The Vancouver region initially did their own stumpage invoices but later processed other regions as well.

Here is a link to the complete story about [New Changes In S & R Accounts](#), an article about S & R processing in the 1960s from which the above was extracted.

Punch cards and 80 byte records

The desire to capture data onto punch cards became so prevalent that the pre-printed forms themselves began to be formatted like an 80 byte IBM punch card. The paper form then could do two things: one, guide the user on how to fill it in and where to place the data; and two, when it came time to keypunch the form, the data entry operator could simply key punch the data row-by-row in sequence, from column 1 to 80. Some forms continue to look this way to this day!! Below are a couple of links to existing forms that still have the look of the punch card layout:

- ♦ [FS1211](#) – Piece Scale Detailed Log Listing
- ♦ [FS505c](#) – Vegetation Inventory - Tree and Shrub
- ♦ [FS176b](#) – Vegetation Inventory Ground Call Measure/Count Point

Computer use in the 60s for land surveys conducted by industry

The following is from Anne Dalton about her father, Art Holmes. Anne is a friend of the author. “My dad created the first computer programs for surveying purposes and I remember going to UBC with him in the 60s and seeing the computer they were using which occupied a whole room. Then my dad’s surveying firm had their own computer which only took up part of a room and was time shared with other companies. All the data came and went by Telex. My dad would have qualified as a surveyor around 1933 and when he was working out in the wilds (which was most of the time) he communicated mainly by ham radio so local hams would talk to him and relay messages

to my mom. How things have changed! He surveyed huge chunks of BC by climbing mountains, building cairns and doing the triangulation with a transit to get distances and elevations. He had to know a lot of astronomy to get bearings and if they were surveying forests they had to give estimates of board feet of the different kinds of trees and also gallons per minute of water in streams and rivers. A surveyor had to know a lot of stuff, mining and fishing, too.”

The 1970s

An excerpt from [Cariboo Forest Region : Memories, 1972-2003](#) provides a glimpse of office work prior to computers:

“The vast amount of paperwork was originally looked after by a steno pool of 30 clerks, who did it all by hand. No photocopies or even carbon copies. The timber section also underwent major changes going from a staff of 25 in the late 70s to less than six prior to the region closing (in 2002). The first computer terminal arrived at the Cariboo District Office in 1977. It was placed outside the steno pool and ignored by almost everybody.”

They also had some “Remember when...” tidbits. Here are a few from the same *Memories* mentioned above:

“Remember when....

- ◆ The WANG was the computer of high technology - complete with "floppy" disks
- ◆ If you wanted a contract in duplicate, you had to think hard about it before typing it - using that thing called carbon paper
- ◆ There was no e-mail and a sense of peace at the end of the day, knowing you had completed your work and no one was asking you questions when you weren't even there”.

A new systems branch and IT gets centralized (the first of many)

In 1976, Forests began using an IBM 370/145 located at Transportation and Communications for billing and S & R invoices. Programming was done by staff in the forest service. This replaced the Vancouver IBM 1440.

In 1975, Frank Towler was an SA4 in Strategic Studies in Forest. In 1976 he became director of the new Systems Services Branch (SSB) in Forests. He had staff members such as John Delarge and a data entry shop.

In 1976, the SSB data entry shop was an IBM 3780 RJE site (remote card reader) with some 8 to 12 IBM key punch machines and data entry staff. In 1978, the key punch machines were replaced by a Mohawk data entry computer. Some people in the data entry shop were Lou Watkins and Sandi Hess.

The BC Systems Corporation (BCSC) was created November 1, 1977. Don Alexander was president. BCSC began to provide shared infrastructure, such as networks and mainframes, and analysts and programmers for application development. Staff from the forest service were moved to the new BCSC; for example, Sauder Thom, Louise Ansty, Ray Badowski, Mathew Nichols, and John Keller. Brian Howden, a May '77 summer student joined as well. Others remained in Forests such as John Delarge and Frank Towler.

1980s – Computer growth begins to take off

Early 80s

By 1980 most branches and regions, but not districts, had access to IBM 3270 terminals and printers to interact with BCSC mainframe systems, and Wang equipment, such as a Wang OIS minicomputer, for word processing. Many of the Victoria based branches got access to Wang based email and office tools, and, as well, a few applications were built for the Wang VS minicomputer which was housed in the SSB machine room.

Shared IBM mainframes at BCSC provided batch, Wylbur, and TSO services and typical programming languages were Cobol, Fortran, and PL/1.

There was no provincial-wide network, PCs, LANs, web, or corporate databases. Applications were headquarters-based and largely batch.

Early efforts involved getting some infrastructure to the 46 district offices which largely had no tools. This involved a number of PCs, word processing, local applications, and dial-up networking to get a level of services into the districts.

Lightning Strikes Detected

In the early 80s Protection implemented a very sophisticated real-time electronic Lightning Location System. It had 15 devices known as direction finders that provided coverage of the entire province. The devices could detect lightning over a huge area. The information was transmitted by telephone wire to a position analyser in Victoria which could print out the lightning strikes on a map. A few terminals located in other offices such as Kamloops and Prince George could access the maps as well. Refer to the 1980s newsletter article about [lightning strikes detected](#).

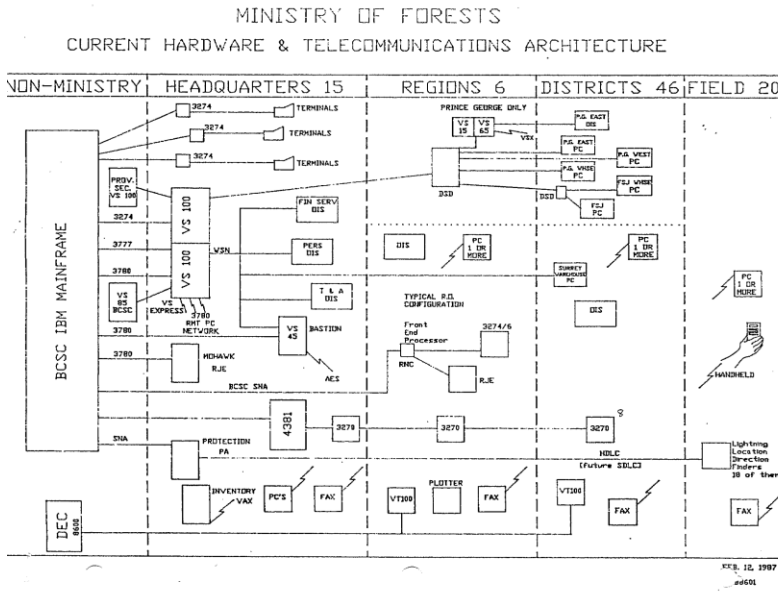
Also the fire weather stations were started in the early 80s. These automated weather stations were located across the province and could send their findings via radio or telephone to a central database. A growing number of forest service offices and fire centres could access this database and call up fire weather reports on demand.

Start of Office Automation and stuff to districts (Wang OIS, some PCs, FMIS store/forward, and more)

In 1983, options were explored for the “Automation of District Offices”. The result of this study led to the deployment of Wang OIS mini-computers and a number of Wang DOS-based PCs to each of the 46 districts. The Wang OIS provided word processing capability and the PCs a set of local productivity tools as well as a set of distributed applications, for example FMIS, the financial management information system. FMIS used a dial-up network to send and receive data with the headquarters central system using a tool called TCHandler. The PC-based component of FMIS was written in dBase II, one of the early PC programming and database languages.

The approval to proceed with this project was given in a [letter from M. Apsey re technology for Districts](#), and a report titled [Automation of the District Offices](#) outlined other options considered at the time.

By 1987, the ministry infrastructure looked as follows: some 50 IBM PCs, 284 Wang PCs, 325 IBM 3270 terminals, 200 Wang terminals, and 100 DEC VT100 terminals. See the architecture diagram below.



Copy of 1987 chart

Forests Systems Services Branch

In 1982 the forest service had a data entry shop in the Systems Services Branch (SSB) at 1450 Government Street, Victoria. There were over a dozen data entry operators who used a Mohawk data entry computer to capture data from paper forms. The bulk of the data was related to harvest billing scale returns. This shop became a machine room for more and more mini-computers and network devices as things grew.

Also in 1982 the card readers were phased out in SSB. All card data was read one last time and copied onto IBM mainframe disk drives. Yes, this was a big change!! There were many folks reluctant to give up their card data, stored in their file cabinets, so close and warmly physical in lieu of a bunch of cold invisible hard drives.

Around the mid 80s the data entry (keypunch) shop and operators were outsourced to a private company. This move, much like the creation of BCSC, was one of many re-organizations that would happen over the years as IT staff grew, got centralized, and sometimes privatized to private sector firms.

The SSB machine room moved at the end of the late 80s from 1450 Government Street to 595 Pandora Ave. The machine room included an IBM 4300 mainframe, Wang VS, UNIX, and NT servers, and network gear connecting most of headquarters. When the systems branch moved to the Jutland Avenue area in the 1990s the SSB machine room was moved to BCSC.

Innovations included the use of high speed fibre optic cables to connect headquarter offices located across the city of Victoria, creating a MAN (metropolitan area network), and the introduction of twisted-pair wiring to replace expensive and bulky shielded coax cable for the internal networks within all forest service offices.

Computers and forestry

In the [Summer 1982 edition of ForesTalk](#) is an article called *The Computerized Forests*. It has an IBM text terminal as a lead-in photo, high tech then. Also, there is a picture of a small flat-bed x-y pen plotter.

The article notes that computers have rapidly become a fact of life for forest managers and quotes the systems director of Crown Zellerbach as having systems for timber cruising, planning, sustained yield, cutting plans, and roads.

The article mentions:

- ♦ the Lightning Location System,
- ♦ the Growth and Yield programs developed by Ken Mitchell of the forest service,
- ♦ Darrell Errico's use of computers for the timber supply profile for the province,
- ♦ and both forests' and MacBlo's implementation of IGDS for computer-based mapping of the entire province.

Handhelds

Handhelds started to be used in the 1980s for field work. Handhelds are small computers, sometimes called handheld data loggers, having a small screen and keyboard that could be held in one hand while the other hand could key in data. Usually they were ruggedized and weather proof as they had to be capable of being dropped and surviving in the field under rainy and freezing conditions. However, how the people survived is a mystery. Handhelds were used by both the forest service and the forest industry rather than water-proof paper forms for scaling and sample scaling, cruise data collection, inventory, silviculture, and research purposes. During one of the tenders to select a handheld for forest service use, a fellow called Jim Bonfonti dropped them down stairwells and tossed them into buckets of ice water to see if they survived. They did.

Late '80s – the start of corporate networks, databases and integrated systems to support district operations

In 1987, following the reorganization and amalgamation of the Ministry of Forest and the Ministry of Lands, the ministry undertook a review of information systems and directions. At this point in time, the provincial network capability to districts was minimal and largely dial-up and existing systems largely branch or departmental. The lack of a suitable provincial network made it difficult to provide districts with timely access to data and information systems. It was understood from previous analysis that a number of ministry functions needed to share data, such as client or tenure data, and that there was a need to more directly support districts who were largely outside the scope of existing systems.

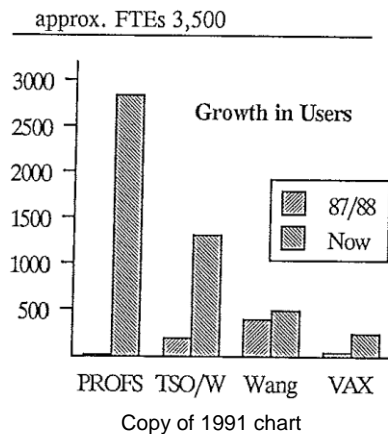
The 1987 Strategic Plan outlined three key goals:

- ♦ to provide a network and terminals to district offices so they could access information systems and email;
- ♦ begin the development of a new set of online integrated applications directly supporting district operations; and
- ♦ begin building an integrated corporate database.

To this end, a major corporate project was undertaken called the "Revenue Project". At the time it was the largest IT project undertaken by the ministry. It was a multi-year initiative with the aim to deliver a set of technologies to support the Revenue Project and in addition to lay the infrastructure and a path for subsequent initiatives. The Revenue Project provided:

- ◆ for each district, region and involved branch an online, real-time SNA network, an initial set of IBM 3270 type terminals (green screen text terminals), and printers. Also, DEC VT100 terminals and a DNET network was provided to enable access to Protection's fire management systems;
- ◆ a Victoria based mainframe computer (IBM 4300) having corporate database capabilities (SQL/DS) and email (PROFS, later to become OV for OfficeVision);
- ◆ the development of an integrated database using an initial set of applications under the scope of the Revenue functions. These included the Client System, Forest Tenures Administration, Harvest Billing, and Accounts Receivable Management.

An outgrowth of this project was the introduction of the ISP (information systems plan) with multi-year and strategic components. This ISP process is still with us today and done on an annual basis.



PROFS, the electronic mail service, grew rapidly. From a handful of people in 1987, by 1991 (see two charts below) it was available to nearly 80% of ministry staff (at some 3,500 FTEs there were 2,700 PROFS users) and email had become embedded into the ministry's way of doing business. The paper-based "Speedy Memo" by then was largely a thing of the past. Staff really made an enthusiastic conversion to electronic mail.

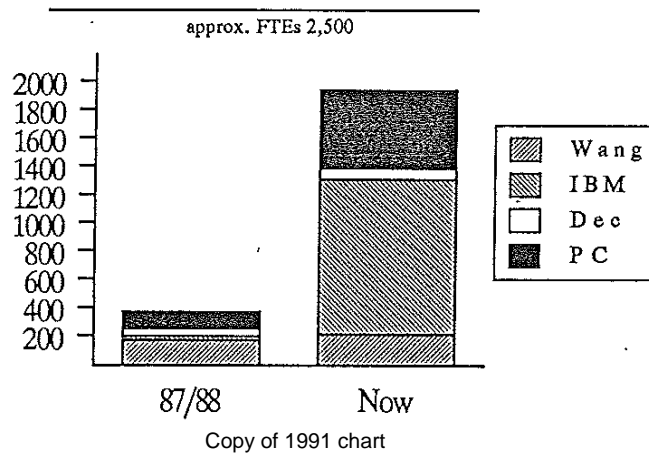
Another significant growth was in TSO/Wylbur/IMS access. These IBM mainframe-based systems housed at BCSC (British Columbia Systems

Corporation) contained the older generation of ministry systems previously not accessible by districts. Also the systems of other ministries became available such as Companies, Suppliers, and BC Online.

As well, the number of DEC VAX users grew rapidly as district staff got access to Fire Suppression systems provided by Protection Branch. This access used the DNET network at the time to provide access to the fire, weather, and lightning location applications hosted on the BCSC DEC 8600.

Along with the growth in users as noted above, there was also significant growth in workstations. Workstations at the time included: IBM 3270 type display terminals, Wang terminals, DEC VT100 terminals, and PCs. Total growth from 1987 to 1991, just in Region and Districts, was almost 2,000 workstations, nearly matching the 2,500 FTE staff count, up from a total of 400 workstations in 1987, with the most significant growth in IBM terminals, from 30 to 1,100, and PCs, from 125 to 550, and DEC terminals from 50 to 80. One note, FTE stood for “full time equivalent” or in other words a person year.

Workstation Growth in Region and District



On the application side, quite a few new applications were built. It was a very busy period hence it is difficult to give full justice here to all the applications and to all the hard work put into this by forest service staff.

John Flanagan recalls from the district perspective that during the 1980s there was a “huge change” and recalls things being implemented like fire management DNET, 3270 terminals, and PROFS email.

By 1991 the key applications of the Revenue Project were largely built and additional applications were developed utilizing the same technology. Region and district staff now had access to some 11 previously built systems, access to some 13 newly built systems, and soon to get access to 7 more new applications that were nearing completion.

Reference, see [1987 Network Architecture](#) and [Achievements of the 1987 Plan](#).

Image printers – revolutionize printing (and so did electronic documents such as PDFs)

Significantly, the IBM 3812 printers deployed with the SNA network roll-out were electrostatic image printers, much like a modern day laser printer.

The IBM 3812 printer, rather than use a laser beam, drew the image on the photostatic drum using a row of tiny LED lights. This printer provided districts the ability to print different fonts, in bold, italic, or underlined, as well as pictures and images, and forms flash output such as a private timber mark or a copy of an invoice from the harvest billing system.

From then on, office printers were of the image type – aka, a laser printer. These revolutionized printing and turned an office into a “just-in-time” publisher, saving the cost and effort of arranging for and using pre-printed forms.

Up to this time, printers were mechanical, such as a high speed, tractor-fed, chain printer in the computer room, or they were typewriter like (like an IBM Selectric typewriter), or they were of the very common dot-matrix and daisy-wheel types.

The dot-matrix and the daisy-wheel printers were so noisy that special foam lined boxes were purchased to contain the printer and so reduce the annoyingly loud machine-gun rapping noise, saving the sanity of the office staff. Since the chain printers were in the machine room only the computer operations staff went crazy from the noise.

The dot-matrix printers were typically either 9 or 14 pin. The Mannesmann Tally dot-matrix printer is an example of one widely deployed, purchased via tender. It was one of the early printers used for word processing. While a dot-matrix could do graphics the results were rather coarse.

In addition to a high speed chain printer, which is an impact printer, also known as a [line printer](#), having a drum, band, or chain for printing characters at high speed, many computer rooms typically had other devices called decollators and bursters to handle the paper after it was printed. The decollators were used to remove carbon between sheets and unwind multi-part paper or forms into neat piles; and the burster was used to separate the tractor-fed paper or forms into individual pages. Another machine called a collator was used to merge multiple pages together into say a booklet. The advent of the laser printer eliminated the need for these devices. With laser printers, individual letter-sized copies could be created on demand. In later years, the documents could be produced in an electronic format, for example, as the now popular Adobe PDF file. PDF files could be either printed or viewed electronically.

Ink-jets were never used extensively although they were sometimes used to print colour labels for file folders. However, a big use of ink-jets was for producing paper maps. These printers, also referred to as plotters, are large format ink-jets, and depending on the model, capable of printing 42" and larger map sheets.

1990s – GIS and LANs to Districts

Much started to happen going into the 1990s and the ISPs (Information Systems Plans) reflected this. The growth of the district network involved both terminals and increasingly, PCs. Taking advantage of this new infrastructure was more development of integrated, corporate applications. For example, in 1992 the first phase of the Integrated Silviculture Information System (ISIS) was completed.

The plan to introduce LANs (Local Area Networks) in all offices started in 1991 and finished in 1992. This would replace the old Wang gear and also the LANs would support the mapping and GIS (Geographic Information Systems) in the districts. To this day we still have a G and an H drive from this LAN project.

Maps and GIS

In 1978, Inventory branch got a DEC (Digital Equipment Corporation) PDP-11/70 minicomputer and Intergraph's IGDS software for mapping. It was the first in the BC government. Data was stored on 1600 BPI DEC tapes and there was special gear to support a "hardware spatial index".

A 10-year project to load paper maps into digital format started around 1979 in Inventory branch. The approach was to load and update. Tenure's headquarters got an Intergraph IGDS in 1985 to support the FAMAP (Forest Atlas Map Update) project, and in 1988 they moved to Intergraph Microstation, a PC-based version of the software. Initially, Inventory, Tenures, and Surveyor General each had their own base maps.

In 1984, Survey's and Resource Mapping started the TRIM mapping project. The map format changed from NAD 27 to NAD 83 which was a big deal. As the new NAD 83 base maps became available, the forest service base maps were changed over to this new common TRIM base. This happened over the course of 10 years, until mid-1990. Map sheets were each in their own file but could be tied with other maps, that is, they could be edge tied. A GIS could pull data from any number of mapsheets to do analysis.

In 1989, GIS tools started deployment to the forest districts. Back then the initiative was called PCs for LIM (Land Information Management) and by 1990 all the regions and about half of the districts had a GIS workstation (Reference: [Computer Equipment Summary 1990](#)).

The GIS workstation was a high powered PC of the day, a digitizer, a plotter and the GIS software. The software included such products as Intergraph Microstation, for updates of Inventory forest cover and tenure Forest Atlas maps (FAMAP), and PAMAP GIS and Digital Resource's Terrasoft for GIS analysis. The analysis software was capable of producing colour themed maps. A later tender process was won by the ESRI Corporation and everything became ARC/Info format.

Organizationally, LIM Managers appeared in Districts to help manage the mapping products and district staff employed to update forest cover, tenure, and silviculture map information and to perform GIS analysis.

From 1988 onwards, Bill Unwin and John Nielson visited every region and district in the province. This went on for some time to help install and train Microstation and Maps3D to be used for inventory and tenure (ATLAS) update, and also teach how to use the spatial analysis tools and the data. John was the main guy with a focus to get the data loaded properly and Bill says he was under-recognized for his efforts!!

These new mapping tools exemplified a significant point in the transition to the era of "spatial databases" where the map polygon represents an area of the earth and could be linked to other attributes describing it as well as linked to business data such as a cutting permit. The quest was on to achieve the goal of spatial/attribute integration and a seamless spatial database.

LANs

The LAN project started in 1991 with a mantra of "50 LANs in 50 days". Well, it took a tad longer than that. The LANs were IBM OS/2 servers (later in the late 90s they went to Windows NT) with tape backup using a token-ring local area network. The LANs replaced the Wang OIS gear. While the Wang OIS previously offered word processing for a select few staff, the LAN and PCs extended capability to nearly all staff and offered more than just word processing. The GIS systems that started deployment in 1989 continued to use the same software as mentioned above however the LANs became the storage hub for the GIS systems as well as the file and print server for office staff. Thus the LANs became referred to as the DDC (Distributed Data Centre).

To support the DDCs the ministry needed staff in each district to provide hands-on support. To this end the DOSS (District Office Systems Specialist) came into being.

Another change was somewhat more cultural. The single purpose word processing function of the old Wang word processing machines tended to reinforce the concept of typing as a clerical role. They were much like a fancy version of a typewriter and the associated steno pool. The old Wang gear was replaced by multi purpose workstations, which professional and technical staff used to originate many of their own documents.

Over time, the steno pools declined and it is quite normal now for staff to “keyboard” and draft their own documents.

While a LAN’s network speed, that is the speed within an office, was in the 10 mbps (mega bits per second) range, the wide-area network that went to each region and district office was much slower. The dial-up speeds in the 1980s of 14.4 kbps improved with dedicated lines of 19.2 kbps and 56 kbps with the SNA network. By about 1995 nearly all regions and districts were at 56 kbps. Some offices moved, at the time, to a fast “T1” speed of 1.5 mbps. In the 2000s, the TCP/IP network that went to each office ramped up to “E10” and sometimes “E100”, that is, 10 mbps and 100 mbps - the speed generally of local area networks. While this enhanced access to applications and the Internet, and helped with downloads from say the ministry FTP server located in Victoria, another main reason was to enable the transfer of LANs (the DDCs) from within district offices to shared regional centres which happened in the 2000s.

Goey Windows and PCs appear at home and in industry

The first Windows PCs (Windows 3.1) came into the ministry about 1991. But just one!! After using it for some tests and trials it was determined that it was decidedly better than DOS based PCs!! However, not everybody liked them and some wished to remain in the DOS world (true story). However, in short order, all subsequent PCs were purchased as Windows PCs.

Up to that time all PCs were DOS based which largely meant the screen was just “text”. There was no GUI, pronounced “goey”, an abbreviation for Graphical User Interface. In other words, GUI means the windows and mouse we all use today regardless of whether it is from Microsoft or Apple.

On a DOS PC you had to type in text commands to do things, although some software was becoming GUI enabled (like Ami Pro, a word processor). The Wang PCs, some hundreds of which had been purchased, were somewhat better than DOS based IBM PCs in that they had a menu system, which made it somewhat easier to launch programs in that one didn’t have to remember how to type in the DOS command to do so. The PC programs used were things like VisiCalc (the first spreadsheet), Multiplan, Lotus 1-2-3 and Wang word processing. Storage was [floppy disks](#), early on 8”, then 5 ¼”, then 3 ½” floppies. Wow, 1.44 megs on a 3 ½” floppy.

The new Windows based machines introduced Microsoft Office, a suite of tools that included Word for word processing, Excel for spreadsheets, and PowerPoint for presentations, which over the years became a standard in the forest service.

What is interesting is that this era marked another transition point. With the advent of PCs, staff and the public could have computers at home faster and more powerful than at work. Before, only big government or companies generally had computer power. The PC changed all that. It became quite common to have a bigger and faster PC at home than at work. They were advertised for sale in for example London Drugs.

Home PCs and industry PCs opened up a whole new world of computing. Staff could work anywhere (telework) and public and forests industry clients could begin to access and participate in the business applications of the ministry via the emerging availability of networks and Internet access.

Mid 90s – the start of the Internet

Early in the 90s there was this new upstart network protocol that was to be vendor neutral, peer-to-peer, and enable a whole new way of providing services. Little did we know at the time it was leading to the Internet.

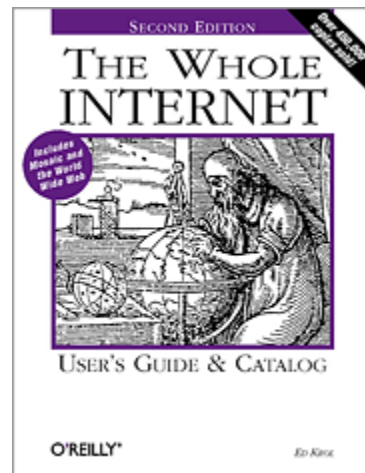
By mid-1990 the strategy was to open up capabilities and move to TCP/IP, peer-to-peer, location independent, and access from anywhere, in other words the Internet. Little did we know at the time it was to become as big a thing as it has!! This was the start of web sites, web applications, e-forms, e-documents, and e-everything.

By 1994, both the wide area and local area networks were converted to TCP/IP and we now had a TCP/IP network with SNA over TCP/IP, and Token-Ring with TCP/IP local area services. The ministry was the first and looked to be a leader in the use of IP based services in government. The next step was to place IP on the desktop to enable the PC to use TCP/IP directly. Dial-in services also started about this time so that one could call into the BC government network while traveling or from home.

(Reference: [Information Technology Architecture 1996](#)).

First web pages

In 1995, internet tools and web browsers were not common. Tools such as Gopher, Mosaic and Masque were just coming out. It's odd to think back to a time when a web page and a web browser wasn't normal stuff. One book read often at the time was the *The Whole Internet User's Guide & Catalog* published 1992 (currently out of print by O'Reilly Media). There was a set of tools like FTP and Gopher and HTML that folks were just starting to try and it was not clear which was going to become popular.



The ministry began to explore the use of these tools to enable things like access to publications and documents and also as a potential new platform for GUI applications. We were searching for the “universal client” that could talk to any vendor’s technology. By about 1996/7 we began to use Mosaic as the web browser and actually deployed it to ministry PCs in districts. The first ministry web server was from O’Reilly, a book publisher actually. Later in the 90s, after Netscape looked like it would take over the browser, Microsoft put significant energy into Internet tools and came up with a web server and their first useful version of their browser, Internet Explorer 3.1. The most significant thing about IE3 was that it had userid authentication, which meant we could secure web servers using the same userid as used for LAN access and create ministry and government intranets. We then deployed IE3 to all ministry PCs and changed to Microsoft’s IIS as the web server.

The forest service was also the first in the BC government to deploy Adobe Acrobat Reader, the viewing tool for the now popular PDF document, to all ministry PCs. This was met with some resistance from central agencies, however they soon recognized the practicality and within a few years, browsers, PDF readers, and other internet tools became common services supported by government.

In the mid 1990s, an FTP service, <ftp://ftp.for.gov.bc.ca/> (al), was offered by the forest service which greatly enabled the secure transfer of files with industry, contractors, and other government departments, replacing the use of floppies, tapes, or CDs. FTP was

one of the early Internet services that looked very useful from the beginning, and it is still in use today.

Also about the mid-90s the forest service created a web server, www.for.gov.bc.ca (al), accessible to the public, the forest industry, and other government offices, and began to publish manuals electronically in web (HTML) and Adobe PDF formats. The web format allowed one to browse in small chunks, which was a good strategy in those days of rather slow network speeds such as 14.4 dial-up or 19.2 and 56 kbps dedicated lines, whereas the PDF format provided a faithful reproduction of a glossy hardcopy in a “digital paper” format which one could view online or print locally – the “just-in-time” electronic document.

After it was possible to host secure web access with a userid logon, the forest service in the later 90s created two Intranets, one accessible to all government staff (gww.for.gov.bc.ca) and the other accessible to only forest service staff (icw.for.gov.bc.ca). Later a fourth web service came along, the Extranet, which was a secure site for both government and industry users.

E-forms, e-documents, and collaboration tools

As a result of a re-organization in the mid-90s, a number of paper-based processes such as forms, manuals, freedom-of-information (FOI), and records became the responsibility of the systems branch (but with greatly reduced staff)!! The idea was to try to use the new emerging technologies to help reduce costs.

Manuals to the web

Some of the first things published on the web were corporate publications such as [Legislation & Regulations](#) (al), the policy manual, and forest practices guidebooks. In a few short years, more and [more publications](#) (al) became available on the forest service website. The forest service was one of the earliest organizations in government to make a large commitment to publish electronic versions of its documents.

As an illustration of change, when the corporate manuals were paper-based, quite an elaborate process was used to keep all users updated. Paper revisions were routinely sent to offices with instructions to replace said pages in their local paper copy, a manual process subject to some error. [Circular letter no. 2091](#) is an example of how manual changes to the Forest Act were sent out in 1949.

Users of legs & regs and policy manuals outside of the ministry paid a couple hundred dollars for a subscription to a paper update process. The web changed all that. A letter went out to subscribers asking if they had any concerns with moving to a free electronic version with notification of updates to be provided by email. Not one subscriber replied in the negative. Electronic manuals on the web quickly became the norm and paper updates were retired.

WhatsNew, Email subscriptions, and Search

In the later 1990s some new electronic services were introduced to help keep people informed of what was happening. These services were made available to government staff as well as to the public. Ministry [News Releases](#) (al) were made available on the web rather than sent as paper or fax specifically to media outlets. A [Subject Index](#) (al) of the ministry web services was made available and a cousin to it, sorted by latest first, was published called [WhatsNew](#) (al). This provided an update of new things published

on the ministry web server. And [Official Notices \(al\)](#) provided such things as Timber Sales opportunities.

To complement the above, email notification services were introduced. People both inside and outside government could go to the [email subscriptions \(al\)](#) website and sign up to be notified via email about the things of interest to them such as notices of Timber Sales, news releases, application bulletins, or the monthly WhatsNew summary.

As another means to find things, the ability to search the contents of the forests service web and FTP servers was provided early-on. Content was “indexed” so that a keyword search could be done very fast. Typically the search button was at the top of the [forest service website \(al\)](#). Search became a very popular service, spawning major internet search engines such as Google and Bing.

Forms

The forest service, being a large organization with many functions, always had lots of forms, forms for field data collection, for industry use, for contracts, for nearly everything – over 1,000 forms. In the later 1990s a forms index was created, the first in government, and all paper-based forms were made available electronically, initially as simple “print-and-fill” Adobe Acrobat PDF documents. Pre-printed paper forms, if available, could also be ordered. The complete forms index was made available to internal staff on a secure server and a sub-set of forms was made available on the [Public Forms Index \(al\)](#) for forests industry and citizen use.

The ministry warehouse was retired after just a few years as it was no longer needed to house and distribute very many pre-printed paper forms – they declined that rapidly. The era of the readily available “just-in-time” form caught on.

Some PDFs were made “fillable” and other tools were introduced such as Shana Informed Filler, Word, or Excel to create “fill-and-print” and “fill-and-send” type forms. Between the increased use of electronic forms, and later on, the development of handheld and web-based applications available to the public and the forest industry, the number of pre-printed forms in use dropped drastically. In many cases the only pre-printed paper forms available are special water-proof forms supporting field work.

Scanners

FAX machines were the first form of scanners. Paper was placed in the fax machine, scanned, sent over the phone line, and printed at the other end. Faxes became popular in the office in the 1980s. As email picked up steam, especially after the conversion to Outlook email in the 1990s which made attachments easy, the use of fax started to decline. Why fax when you can email?

PC attached letter and legal sized flat bed scanners began to be used by offices, mostly to scan maps or photos. In the late 90s high-speed scanners began to be used by the litigation and FOI groups to make electronic copies rather than paper photocopies of all documents. The FOI group could then use a tool to electronically redact a document, review the redacted draft and produce a final copy. In the 2000s, many offices began to use MFPs (multi-function printers) that could print, scan, and copy. These acted like the office photocopier and scanning became more routine for routing purposes as well as for electronic record keeping.

In the late 1990s, many old paper maps were scanned. Depending upon what shape the map was in these were sometimes referred to as the “good, the bad, and the ugly”. More

recent paper maps could be easily digitized on a large format map scanner, hence the good. An ugly would be an old linen map sheet that was falling apart. Usually they had to be sent out to a company that had an archive quality large format flat bed service, i.e., a really good digital camera and lighting. Typically the same service could digitize artworks such as paintings. Scanning in fact became quite useful for archiving and thus avoiding further loss and damage of originals, while making the electronic version easily accessible to a wider audience. You can see some examples of these scanned maps under the section called **Maps** above.

New email with Internet connectivity

With all the growth in usage, by 1995 there were some concerns with exceeding the capacity of the forest service IBM VM mainframe and the costs to expand it to take on new things.

One action was the replacement of OV email (that is OfficeVision) with Exchange servers and the Outlook email client, both newly released at that time by Microsoft. This reduced the workload on the IBM VM mainframe and opened up new capabilities to easily have attachments and calendar functions as we know them today. Also, the Internet was expanding, and as the forest industry and the public acquired computers and network access, a whole new world of sending and receiving email with the outside world opened up.

Web-Based Systems and new Database technology

Up until the late 90s, nearly all central systems were “green screen text based” IBM 3270 type applications. While these proved very useful there was no ability to have a GUI (Windows-like) screen or display images, photos, or maps. The ministry did have some client/server “thick applications”, however there were always concerns with the challenge to manage and deploy them easily as they typically had to be installed on the user’s workstation and they couldn’t follow the user around as the user moved or travelled.

In the later 1990s, the ministry started to use web-based applications. The programs were on the web server and a browser was used to access them. Initially, a set of small web applications were developed using Microsoft’s ASP and Access databases, for example, the [Forms Index \(al\)](#). This helped to prove the concept. Then later, to support major corporate applications such as the [Harvest Billing System \(al\)](#), Java was chosen as the new programming language coupled with Oracle, the BC government standard, as the new database server. The Java programs would run on a suite of application servers which could be scaled to handle the workload. From this grew the “WebADE”, for Web Application Development Environment, a set of tools and standards still used by the forest service to this day.

MUNT and Terminal Server

By the late 1990s, a strategy was adopted for the deployment of “thick” and “thin” applications. The thick client/server applications would be deployed via MUNT (that is, Multi-user NT, later known as Citrix or Terminal Server), and thin applications would be deployed via the Web ADE. For example, the GENUS application used by Timber Sales was deployed via terminal servers.

What this meant was that an application that normally would have to be installed on a user’s PC could instead be run from a server but otherwise appear to be running on the

user's PC. This greatly simplified management and it also offered the power to run the application from anywhere, even from home or on the road. Some examples that used the terminal server approach are GENUS and some GIS analysis tools. Meanwhile, the web-based applications didn't have to be installed either, one of their powers, as they operated using the web browser, but web applications sometimes had limitations. So both ways were used when advantageous.

Extranets, intranets, and partnering with industry and government

Computer availability and Internet growth enabled new ways of doing business electronically for many different stakeholders. A number of new opportunities opened up, for example, partners could exchange electronic data across their systems rather than use paper; or choose to use one shared system that supported their common needs; or choose to share in the development of a solution and each run a copy of it. These concepts applied to public access, forest industry clients, and BC and Federal government offices.

While the forest service did introduce an Electronic Data Interchange (EDI) Utility for harvest billing scale data back in 1992, new internet and XML based methods emerged and became an increasingly desirable way for the forest service and the forest industry to exchange data and achieve an efficient integration and transfer of electronic data between systems. The resulting ESF initiative (see next page) included such applications as HBS for scaling data, FTA for cutting permits, RESULTS for forest regeneration, ECAS for appraisal submissions, and Lexis for exports.

Collaboration

As workstations became as normal as having a pen or a desk, staff began to use a collection of tools to support projects and project teams spread across offices. Email of course was a main tool. And the LAN allowed workgroups of people to share, review and edit documents. The FTP and web servers allowed project teams to be spread across government or the private sector and later in mid-2000 Microsoft SharePoint services added additional capability to support project teams.

During the OfficeVision era, there were tools called BBs, for Bulletin Boards, and CBs, for Conference Boards. Internet Newsgroups and Exchange public folders were tried but never really caught on.

However Internet meetings did catch on and became very useful to conduct "virtual" meetings. In one common method, all attendees would join a telephone conference call. The phone was an easy means to deliver the audio stream as teleconference calls were quite common. Then each attendee would open a shared document on their workstation, such as Word or PowerPoint, or open a SharePoint issues list, and collectively review it. For training of applications and demonstrations of software, Microsoft NetMeeting was used initially (later to be called Windows Messenger and Office Live Meeting) and for virtual classroom style training a tool called iLink (also known as LearnLink) was used for some time.

The 2000s

Growth of wireless, cell phones, and smartphones

The 2000s saw the growth of wireless cell phones and smartphones. The BlackBerry smartphone became a mainstay of many government users. When it first became available the BlackBerry only did email as its beginnings were a mobile message service, like a pager but with two-way messaging. It took a few years before it acquired phone capability like a cell phone. The BlackBerry let staff access email from anywhere but also led to the ailment called “Blackberry thumb” as both thumbs were used to type on the little phone’s keyboard.

Conversion to Web-based applications

By the early 2000s, now that all that Y2K stuff had been dealt with, a new initiative called the VMAR project started. The letters stood for “VM Application Revitalization”, not a great name, but what it really meant was to convert all the IBM 3270 green screen, text based applications developed in the 1980s and 90s on the forest service IBM VM mainframe into GUI (pronounced gooey, for graphical user interface) web-based applications with colour graphics and a mouse. It was a significant initiative and encompassed most of the corporate applications such as tenure administration, revenue billing, silviculture, and enforcement.

The IBM VM mainframe ran all the applications as well as the IBM DB/2 database. The new Web ADE (for Web Application Development Environment) used Java for the program code and Oracle for the database. With this new approach, many Java application servers could be used to handle the load, providing flexibility, and the Oracle database, being a server on its own, could likewise be scaled as needed. It was also accessible directly by any number of other applications, reporting tools, and services. To this day (2011) these corporate applications remain in the Web ADE environment.

To round out the “Web ADE” a set of tools and utilities were created. One, called Adam, is used to manage access to applications. Another, called the [Electronic Submission Framework \(ESF\) \(al\)](#), is used to enable the receipt of electronic XML based transactions from the forest industry. Many of the new Web ADE applications embrace all stakeholders and thus are accessible to the forest industry or the general public. For example the [Harvest Billing System \(HBS\) \(al\)](#) is used by the forest industry, the BC government, and the general public.

In collaboration with the forest industry, big changes happened in how the forest service received data from industry. Gone was that paper stuff. Industry built systems that could send data electronically to forest service systems. Examples include:

- ♦ detailed scale data used for billing in the Harvest Billing System (HBS);
- ♦ cutting permit requests having both application and spatial (map) data for the Forest Tenure Administration System (FTA);
- ♦ both tabular and spatial data for the Reporting Silviculture Updates and Land status Tracking System (RESULTS); and
- ♦ appraisal data for the Electronic Commerce Appraisals System (ECAS).

The new systems also tended to embrace electronic records. For example, the Harvest Billing System (HBS) stores all invoices as static xml and pdf files and provides access

to these electronic records to forest industry, public, and government users over the web.

Access to systems such as Fire Weather and Fire Danger Rating were made available on the public web, and internally, systems such as Dispatch, used to help with fire fighting operations, can receive location data from GPS trackers carried by aircraft and forest service vehicles and place their real-time location on a map display.

The “results” of all this activity can be summarized using the RESULTS application as an example, which has its description [on the public web](#) (al) as follows:

Data submitted under the Electronic Submission Framework (ESF) is explicitly linked to associated spatial information, thereby ensuring consistency in the geographic information. Information is accessible at all times to Ministry and forest industry staff either on-line or through various reports. All data (including Spatial data) is replicated to the Ministry of Agriculture and Lands - Integrated Land Management Bureau's Land Resource Data Warehouse (LRDW) and can be viewed in RESULTS using MapView. Information providers may subscribe to the LRDW Distribution Service where users can order data for download from the warehouse.

This description represents a significant achievement of goals. Good job for the forest service!! For example:

- ♦ data is sent electronically, including the spatial data, and not paper and paper maps;
- ♦ the information is available to the public and government and industry staff over the web; and
- ♦ both the textual and spatial (map) data is stored in a shared integrated government-wide land information database.

Maps and spatial data in the later 2000s

In the late 1990s a project called INCOSADA began. The name is not the name of a dance, rather, it stands for the Integrated Corporate Spatial and Attribute Data (INCOSADA) program. The objective was to define the data standards and specifications for spatial data and how to link attribute data to spatial data, primarily tenure and silviculture results data. This project morphed into the LRDW project, meaning the Land and Resource Data Warehouse. The LRDW is a central, consolidated repository of land and resource information from across the province, offering a powerful suite of services for clients in government ministries and other agencies, business partners, and the public. The LRDW allows users to browse, search, query, view, access, analyze, order, pay for, and download data sets from the warehouse. Yes, you guessed it; I did copy that from [their website](#) (al).

For example, RESULTS data comes into the forest service from industry electronically. Staff in Kamloops check and validate this data using VRIMS (Vegetation Resource Inventory Management System) and if it is ok the forest cover information gets updated in the LRDW.

You can see the advancement in mapping over the last 100 years in the description below, copied from the [Forest Analysis and Inventory Branch \(al\)](#) website, regarding the availability of forest cover information. Here's what they say November 12, 2010:

Provincial Forest Cover Data posted to LRDW — The Forest Analysis and Inventory Branch is pleased to announce that a new release of the Provincial Forest Cover Data, also know as Vegetation Resource Inventory (VRI), is currently available in the [Land Resource Data Warehouse \(LRDW\) \(al\)](#). Detailed information about this release can be found at [VRI Data Management \(al\)](#).

Hence, in 2010, one can view maps of inventory, tenure, and silviculture results online in an integrated government database. Here are some examples of online maps:

- ♦ [the iMapBC online map viewer \(al\)](#), mentioned as a link within the LRDW website, can display forest cover as well as other natural resource information of BC;
- ♦ [B.C. Forest Fire Information \(al\)](#) with maps such as the [Fire Danger Rating \(al\)](#);
- ♦ [Biogeoclimatic Ecosystem Classification \(BEC\) of BC \(al\)](#);
- ♦ [Tree Farm Licences and Timber Supply Areas \(al\)](#);
- ♦ click [here \(al\)](#) to see a very remote area of BC, count the trees and figure out where this link took you!! [Orthophotos \(al\)](#), a geometrically corrected aerial photograph, of B. C. have been loaded into Google. See a [news article \(al\)](#).

The 2010s

Are we there yet? Maybe for some things

Looking back at the periods from 1980 to 2000 there seems to have been a lot of change every few years. Technologies became obsolete, like punch cards, or minicomputers from Wang and Digital Equipment. Big things came along like TCP/IP and the Internet. But looking at the 2000s it appears some things are remaining somewhat the same, perhaps an evolutionary plateau for the moment.

For example, workstations used to chase the performance curve but now the average PC seems powerful enough. Microsoft Exchange/Outlook continues as the email service. The desktop remains Microsoft, the current deployed flavour in the forest service being Windows Vista with Office 2007 versions of Word, Excel, PowerPoint, and Access (Windows 7 and Office 2010 are available at the time of this writing). The web servers continue to be Microsoft's. The Internet is largely the same although growing. The Web ADE, having Java and Oracle continues to be used. And things like forms and document management continue using the same tools.

Organizationally, one theme seems constant over the years, and oddly enough, it is change itself!! The forest service on the business side has undergone many organizational and staffing changes, some would say every 3 to 5 years. On the IT side, as new positions are identified to support new technologies, they tend to become centralized, with positions moved to a central agency, and the central agencies in turn have outsourced more services, such as server, network, and desktop support to private firms.

There has been growth in the use of social networking tools such as Facebook and Twitter. And wireless smartphones and tablets are growing globally and expected to outnumber desktop and notebook devices.

So what's next??

Well, let's leave that for the next person to write up in the 150 year IT history of the forest service.

Appendix

About the author

Fred Beinhauer came to the ministry in 1982 and became involved in systems planning and the implementation of new technologies and corporate-wide systems. He has worked as a business analyst, project leader, and systems architect. This experience has provided Fred with quite a view of the evolution of computer systems in the forest service. This has helped him to compile this story. For more information about him refer to "[Fred's Retirement Pamphlet](#)".

Acknowledgements

The following people provided verbal or written material and their contributions are greatly appreciated: David Miller (radio), Alex Stewart (radio), Jim Challenger (reference material), John Flanagan (historical circular letters, guides, and manuals), Brian Howden (spatial, infrastructure), Bill Unwin (spatial), Clive Hunt (system plans), Ryan Matthews (network), Darryl Hawkins (network), Greg Grove-White (HBS), David Ford (radio), Denis Meier (mainframes), Louise Beinhauer (copyeditor).

Components of this document

The main body of this document is called FSITHist.pdf and can be read standalone.

Historical material collected and scanned during this project that the main document references however is contained in a set of pdf documents each of which was made to be some 2mb in size so it will open faster than if one big document. There are 20 documents in total, one main document and 19 reference documents. The complete set of these 19 reference documents have file names like FSITHistX.pdf where X is equal to a, b, c, d1, d2, d3, d, e, f, g, h, i, j, k, l, m, n, o, p.

Other reference material is not contained in the above if it is already archived and accessible in the BC Archives or the forest service library.