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ECONOMIC INTELLIGENCE REPORT

REGIONAL SURVEY
OF POST AND TELECOMMUNICATIONS SERVICES
IN THE USSR:
KAZAKHSTAN AND CENTRAL ASIA (REGION X)
1950-58



CIA/RR 59-11

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FOREWORD

This report is the first of a series designed to measure the distribution of post and telecommunications services and facilities of the Ministry of Communications of the USSR, by economic region. Special emphasis is given to relationships of the development and distribution of the post and telecommunications services and facilities of Region X to the geographical characteristics of this region and to the USSR as a whole.



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REGIONAL SURVEY
OF POST AND TELECOMMUNICATIONS SERVICES IN THE USSR:
KAZAKHSTAN AND CENTRAL ASIA (REGION X)*
1950-58



Summary and Conclusions

The post and telecommunications system in Region X, under the operation and control of the Ministry of Communications of the USSR and the various republic ministries of communications, has grown more rapidly since 1950 than that in the USSR as a whole. The rapidity

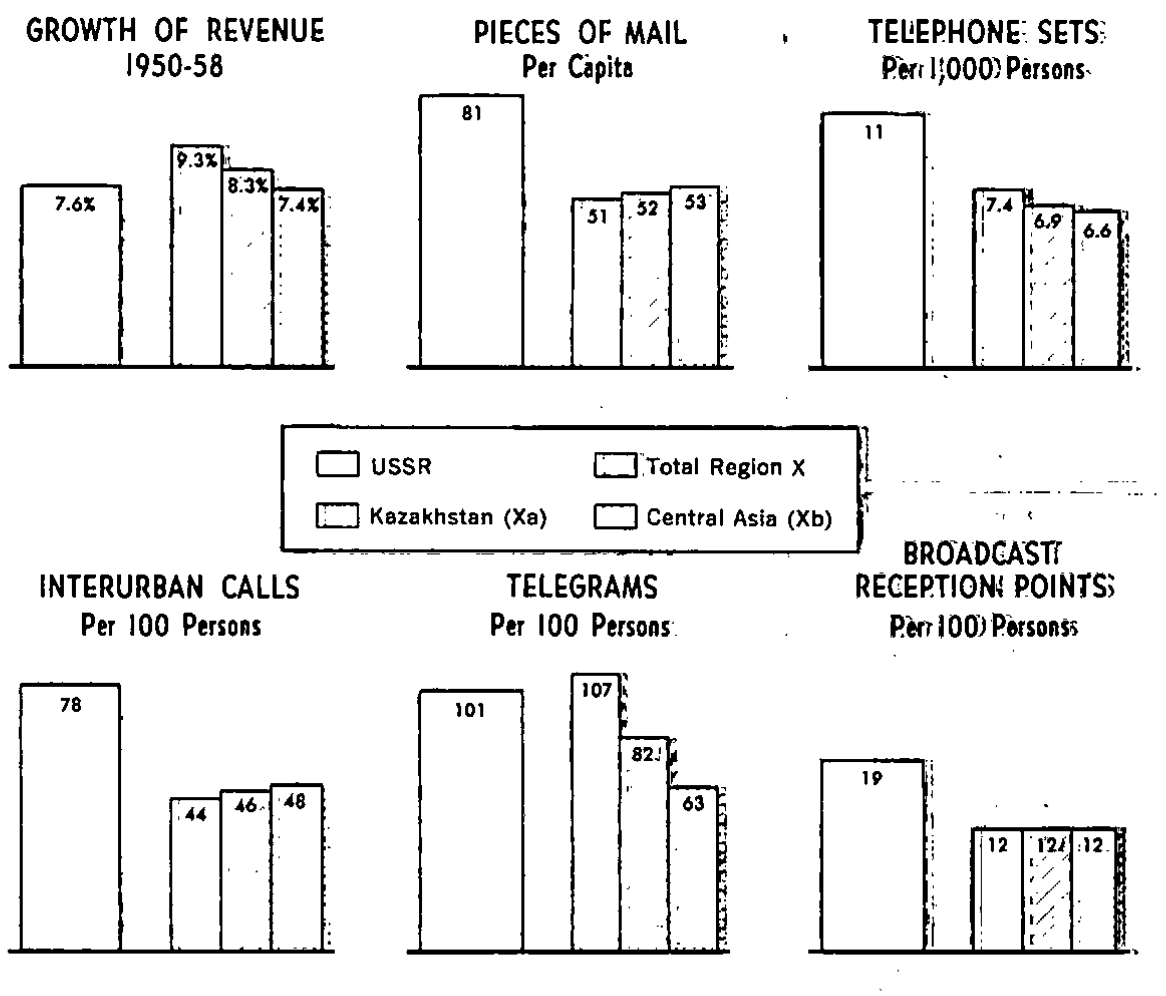
* The estimates and conclusions in this report represent the best judgment of this Office as of 1 February 1959. Technical terms are defined in Appendix A, Glossary of Technical Terms.

The term region in this report refers to the economic regions defined and numbered on map 13702 (First Revision, 8-57), USSR: Political-Administrative Divisions and Economic Regions, August 1957. The insert above shows the location of Region X, which has two main divisions, Kazakhstan (Region Xa) and Central Asia (Region Xb).

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of this rate of growth* is primarily attributable to the communications requirements generated by the new lands program in Kazakhstan. Nevertheless, post and telecommunications services and facilities in Region X have not kept pace with the requirements of the economy and of the general public. Facilities are too low in service capacity and too thin in geographic distribution. As shown below, the level of post and telecommunications activity in Region X was substantially lower than the aggregate level of activity in the USSR in 1958.



* All average annual rates of growth expressed in this report were computed on a compound interest basis.

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Region X, accounting for about 11 percent of the population of the USSR and about 18 percent of its area, contributed only 7.6 percent of the total revenue of the Ministry of Communications in 1958.

The present low level of post and telecommunications activity in Region X is attributable in part to the low priority of its investment in the past, to the inability to obtain equipment when investment funds were available, and to the problem of providing facilities over difficult, thinly settled terrain.

The most serious telecommunications deficiency in Region X is in common telecommunications facilities. The existing common facilities in most instances do not provide adequate channel capacity or normal quality of service. These inadequacies were aggravated by the economic reorganization of 1957, which divided the USSR into 105 new economic areas. Of this total, 17 were established in Region X. The establishment of these new areas, each governed by a council of national economy (sovnarkhoz), generated additional requirements for lateral service that could not be met by the radial configuration of existing common facilities.

Preliminary plan announcements for the Seven Year Plan (1959-65) suggest that priority attention will be given to removal of these and other deficiencies through the construction of new facilities rather than the expansion of existing facilities. Microwave radio relay facilities are to be extended and are expected to provide the base necessary for the further development of telephone, telegraph, and network radio and television service within Region X. In addition, the wire-diffusion network is to be completed, and radiobroadcasting and television facilities are to be expanded considerably by the end of 1965. During the course of the new plan, particular attention will be focused on the provision of those post and telecommunications services and facilities needed to meet the new requirements created by the economic reorganization.

Narrowing the gap between the demand for service and the availability of service will enhance the ability of the Ministry of Communications to make a fuller contribution to the acceleration, cohesion, and coordination of economic activity in Region X. The industrial support and the indispensable agricultural support which the region gives to the national economy suggest that the gap will be closed. At the same time, such an accomplishment will provide the military forces with additional strategic communications facilities both for present and for emergency employment.

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I. Introduction.*

Post and telecommunications facilities are established to provide an economic service in response to requirements that arise from all forms of economic activity. The quantities and types of post and telecommunications service as well as the quality of service in an area are influenced by both its level of economic activity and its geographical characteristics. Predominant among these characteristics are the size, distribution, and level of culture of the population; the topography; and climatic conditions. For a better understanding of the requirements for post and telecommunications services and the factors which influence their development in Region X, the following geographic brief is given.

Kazakhstan and Central Asia** cover a vast arid and semiarid area that stretches across the southern part of the USSR from the Caspian Sea to the border of Communist China. Raw materials -- primarily cotton, grain, and minerals -- are the chief contribution of this area to the economy of the USSR.

A. Kazakhstan (Xa).

Economic Region Xa, Kazakhstan, includes more than 1 million square miles, or about one-eighth of the area of the USSR (see Figure 1***). According to an official Soviet estimate, the population of Kazakhstan totaled 8.5 million in 1956 and is increasing rapidly. Between 1940 and 1956 the increase amounted to more than 2 million. About 62 percent of the population is classified as rural. The accompanying map, Figure 2,**** shows the distribution of population in Region Xa. As a result of the new lands program, 600,000 new settlers moved to northern Kazakhstan from the European USSR between 1954 and 1957. A continuing movement of people from the European USSR may be expected as the economic development of Kazakhstan progresses.

Kazakhstan is important to the Soviet economy both industrially and agriculturally (see Figure 3****). Although the republic has less than 3 percent of the industrial workers in the USSR, its industrial commodities are of primary importance to the nation. Its industry is being expanded rapidly. Mining, metallurgy, and machine

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** Kazakhstan (also referred to as Kazakh SSR) and the Central Asian republics (the Kirgiz, Uzbek, Tadzhik, and Turkmen SSR's) comprise Economic Region X.

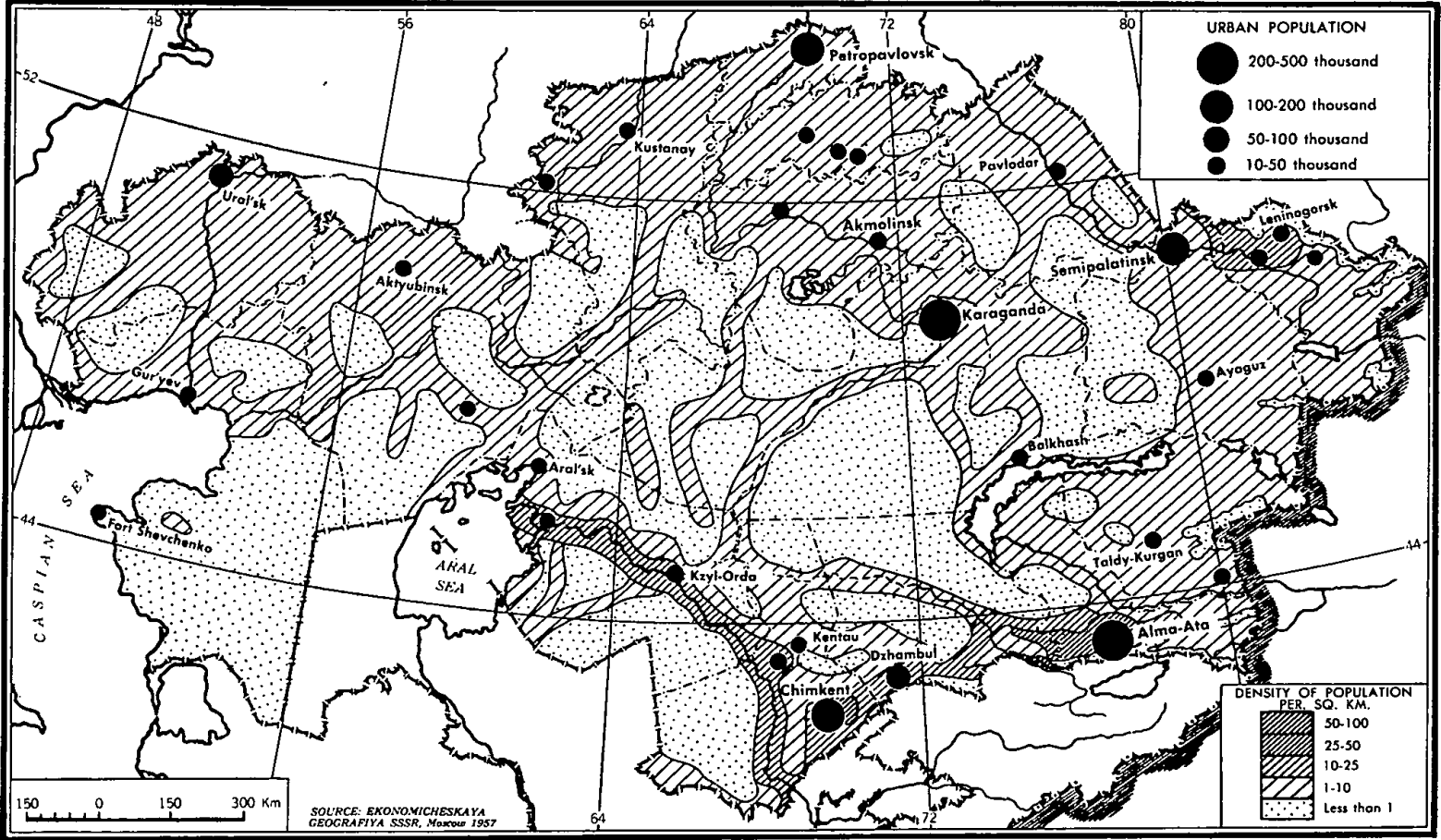
*** Inside back cover.

**** Following p. 4.

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Figure 2



POPULATION DENSITY IN SOVIET KAZAKHSTAN

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building are the chief industries, but the consumer and food industries are also significant. All of the industries are based on the abundant and varied mineral resources of Kazakhstan, one of the richest mineral areas in the USSR. The Karaganda coal basin is the third largest producer in the USSR. Kazakhstan is also a leading producer of nonferrous and rare metals.

The agricultural economy of Kazakhstan is characterized by a wide variety of crops and by a rapid increase of crop acreage. Wheat and other grains are extensively grown in the north. The new lands program brought under cultivation 20 million hectares of land, primarily for grain crops, between 1954 and 1956. Further expansion is planned.

A sparse railroad network provides the major means of overland transportation in Kazakhstan.* The railroad system is being rapidly extended to meet the needs of the expanding economy. River transportation is of minor importance. The road system, being poorly developed, is of local importance only.

The vast extent of relatively uninhabited terrain in Kazakhstan makes the region ideally suited for military-scientific testing of special weapons systems. The central and extreme western portions of Kazakhstan are used as ballistic missile testing ranges. An important atomic testing area is located near Semipalatinsk in eastern Kazakhstan, and the island of Vozrozhdeniya in the Aral Sea is believed to be used for experimentation in bacteriological warfare.

B. Central Asia (Xb).

Economic Region Xb, Central Asia, has an area of 475,000 square miles, or about one-twentieth of the area of the USSR, and includes the Kirgiz, Uzbek, Tadzhik, and Turkmen SSR's (see Figure 1**). It is a land of deserts and mountains and is important economically because of its production of textile raw materials, chiefly cotton.

In 1956 the population of Central Asia was estimated to be 12.4 million, about 6 percent of the national total, and it is increasing rapidly. About 68 percent of the population is rural.

* Several important rail lines have been omitted from Figure 3 (inside back cover). The most important is the Central Siberian Railroad, which will run from Kustanay to Barnaul. Most of this line has been completed. Other important lines, completed or under construction, include those to Dzhetysay, Turgay, and Druzhba (to Communist China).

** Inside back cover.

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The accompanying map, Figure 4,* shows the distribution of population in Region Xb.

The economy of Central Asia is based on irrigation farming, with cotton as the chief crop (see Figure 3**). Although including only 3 percent of the cultivated area of the USSR, Region Xb is highly important as a supplier of raw materials -- cotton, silk, and wool -- for the textile industry. Four-fifths of the cotton of the USSR and about half of the silk are produced in the region.

Industry in the area is closely geared to the growing of cotton and other irrigated crops. The region has a wide variety of mineral resources, including petroleum; gas; coal; uranium; iron ore; and various nonferrous metals, rare earths, and other minerals, but exploitation has been slow. Central Asia accounts for only about 2 percent of the gross industrial output and less than 3 percent of the industrial labor force of the USSR.

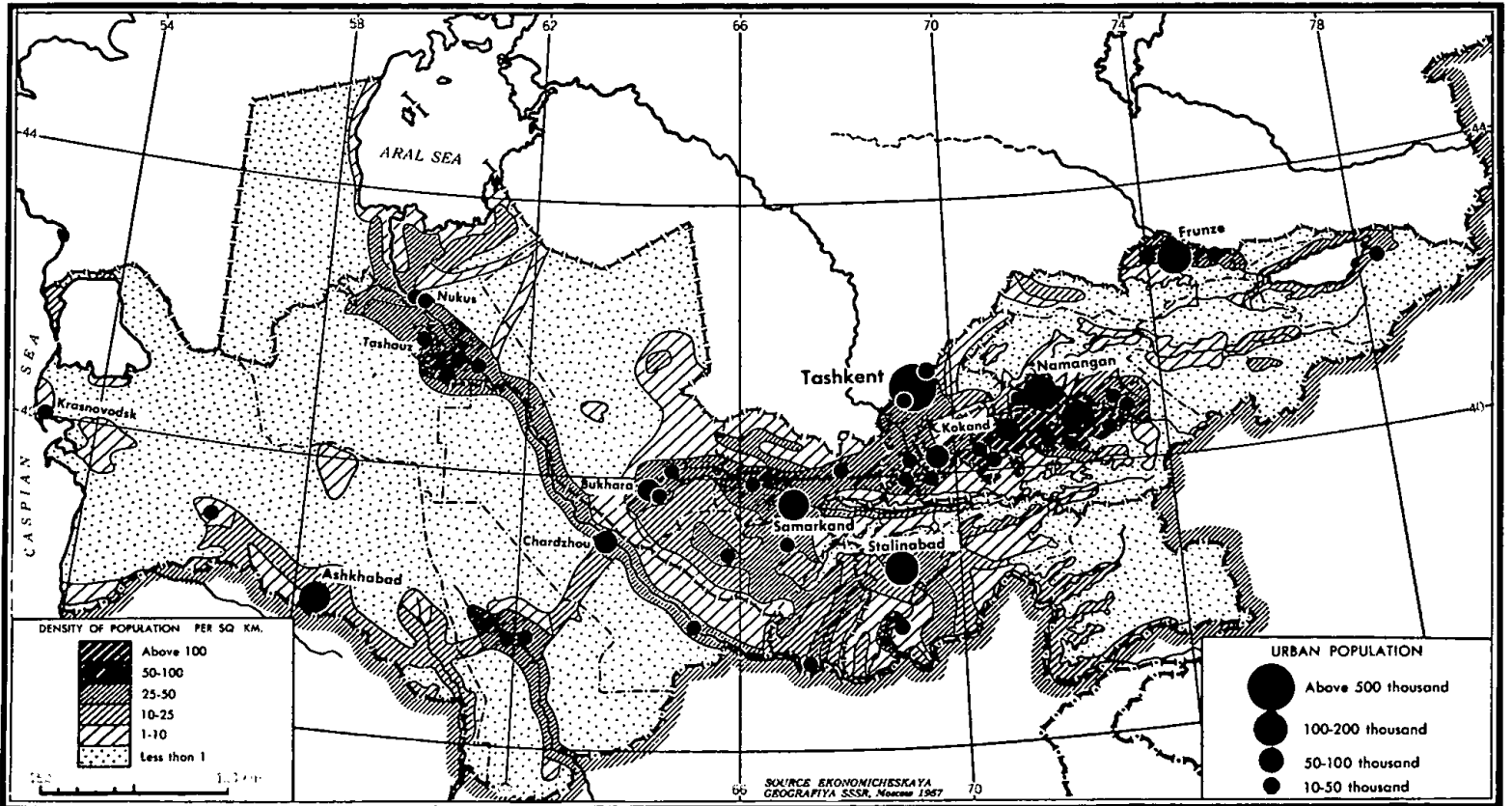
Railroads are the chief means of transportation in Central Asia. Although sparse, the railroad network is adequate to satisfy existing demands. River transportation is of minor importance and is limited primarily to the Amu Dar'ya. In contrast, the road system is fairly well developed. It supplements the railroad network in the more inaccessible mountain and border areas. A distinctive characteristic of the road pattern is that many of the major roads lead from the international borders to the interior, obviously for military purposes.

Thus Region X is a unique region of the USSR in many of its geographical characteristics. Most of these characteristics, especially topography and distribution of population, have adversely affected the development of post and telecommunications in the region. Investment, maintenance, and operating costs of facilities per unit of service are extremely high. These adverse cost factors have not been met in the past by greater amounts of investment and operating funds. Consequently, the level of resources of the post and telecommunications sector in Region X has not been commensurate with the demands for its service from other sectors of the economy in the region.

* Following p. 6.

** Inside back cover.

Figure 4



POPULATION DENSITY IN SOVIET CENTRAL ASIA

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II. Ministry of Communications.A. Organization.

The Ministry of Communications (Ministerstvo Svyazi) of the USSR is organized as a union-republic ministry, and it directs local communications organs through republic ministries of communications. Thus each of the five republics in Region X has a ministry of communications, which is under the over-all administrative and operational direction of the Ministry of Communications of the USSR.

The Ministry of Communications of the USSR, with headquarters at Moscow, exercises direct control over the management of all post and telecommunications facilities and related activities in the country which are on the national level -- that is, which have national significance. This control is accomplished through functionally organized administrative and operational bodies. The administrative responsibilities are vested in staff departments and administrations and the operational responsibilities in main administrations. The republic ministries of communications, as in Region X, have corresponding operational administrations and, for the most part, administrative staff departments and administrations. At the oblast level within the republic ministries are comparable operational administrations. These oblast administrations carry out their responsibilities through okrug, city, and rayon communications offices. Communications enterprises in turn are subordinate to these offices. 2/

The foregoing description of the organization of republic ministries of communications does not give the actual lines of operational authority and responsibility. It is believed that, in practice, republic ministries of communications are limited in their operational control over oblast administrations and their subordinate organs -- in fact, it appears that a large part of the operational control is vested in the operational main administrations of the Ministry of Communications of the USSR. Republic ministries of communications appear to serve primarily as focal points for the initiation and coordination of communications planning for the republics and also appear to act in a liaison capacity in administrative matters between the communications organs on the national level and those on the local level.

The importance to the USSR as a whole of the post and telecommunications services provided by the national and by the republic ministries of communications precludes any substantial organizational change from the highly centralized structure that presently exists. Nevertheless, there is evidence that within the existing organizational framework the republic ministries of communications in Region X

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are gradually taking on increased administrative responsibilities for initiating, planning, and acquiring investment funds and materials to develop post and telecommunications services and facilities. These increased responsibilities are being assumed primarily as a result of the economic reorganization of 1957, which generated increased local requirements for post and telecommunications services and facilities.*

An opportunity for the republic ministries of communications to acquire increased operational responsibilities may be presented by the current integration of functional telecommunications facilities** with those of the ministries of communications of the USSR and the republics. If this integration is as extensive as anticipated, encompassing virtually all functional telecommunications facilities, the Ministry of Communications of the USSR may be forced by the size of the undertaking to delegate more operational control to republic and oblast organs. 3/

B. Revenue.

The 1958 revenue of nearly 900 million rubles*** that was received by the republic ministries of communications in Region X represents 7.6 percent of the revenue received by the Ministry in the USSR as a whole. Central Asia contributed about 52 percent of the revenue in Region X and Kazakhstan about 48 percent (see Table 1****).

The following index of revenue shows that communications revenue has grown slightly faster in Region X than in the USSR as a whole. It is also apparent from this index and from the accompanying chart, Figure 5,† that the rate of growth in revenue in Kazakhstan was comparable to that in Central Asia in 1957 and 1958 but grew more rapidly than that in Central Asia between 1950 and 1956.

* The economic reorganization, which became effective on 1 July 1957, abolished or reconstructed most of the All-Union and union-republic industrial and construction ministries, abolished a number of republic ministries, and altered the central planning organization. The new law strengthened the economic managerial authority of the 15 union republics and created 105 economic areas, each governed by a council of national economy (sovnarkhoz) to manage directly most industrial enterprises and construction sites. Kazakhstan was divided into 9 economic areas, Uzbek SSR into 5 areas, and the Kirgiz, Tadzhik, and Turkmen SSR's into 1 area each.

** See IV, A, 1, pp. 23 ff., below.

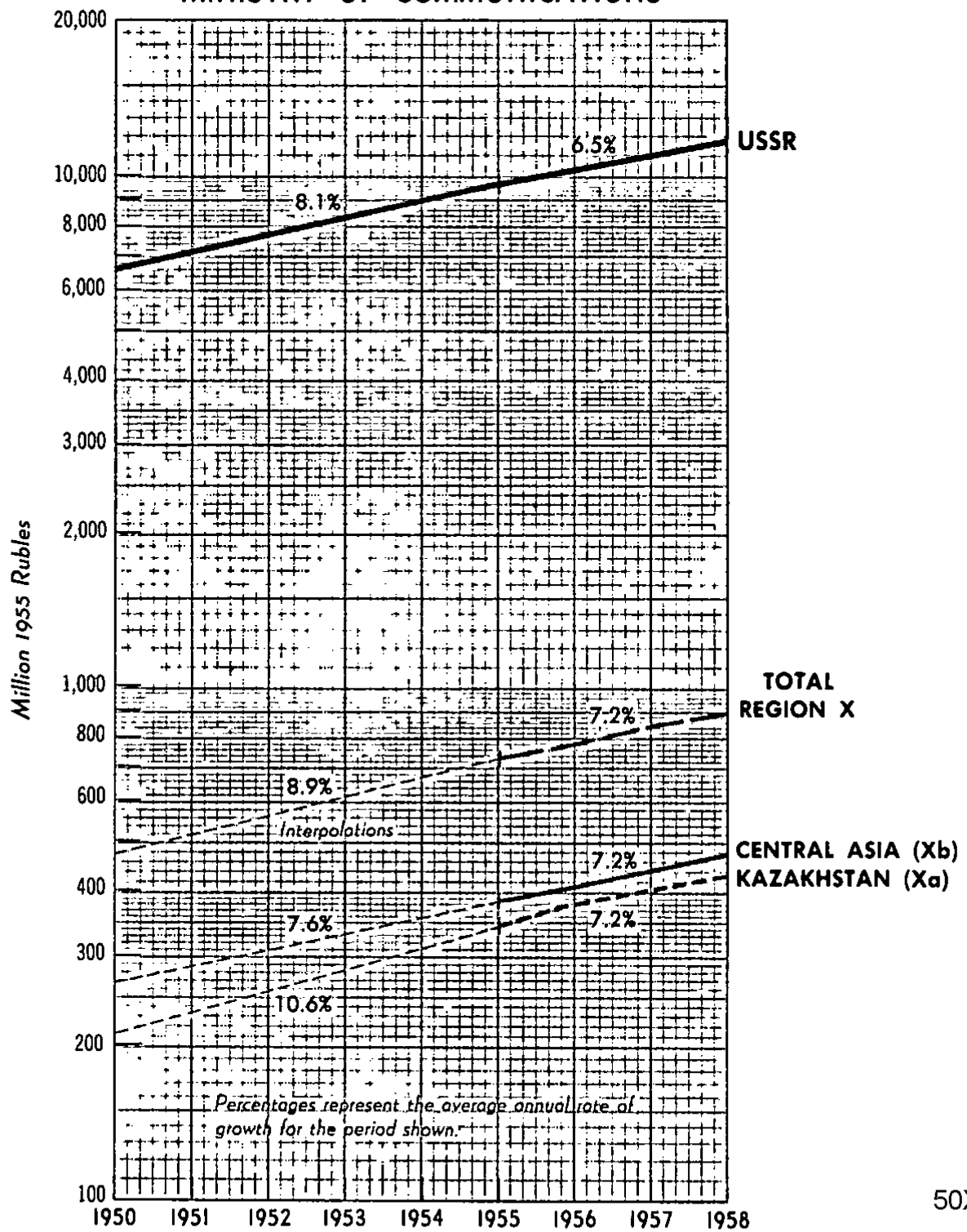
*** Ruble values in this report are expressed in 1955 rubles and may be converted to US dollars at the official rate of exchange of 4 rubles to US \$1. This exchange rate, however, does not necessarily reflect the true dollar value.

**** Table 1 follows on p. 10.

† Following p. 8.

Figure 50X1

COMPARISON OF THE RATES OF GROWTH OF COMMUNICATIONS REVENUE IN THE USSR AND IN ECONOMIC REGION X, 1950-58 MINISTRY OF COMMUNICATIONS



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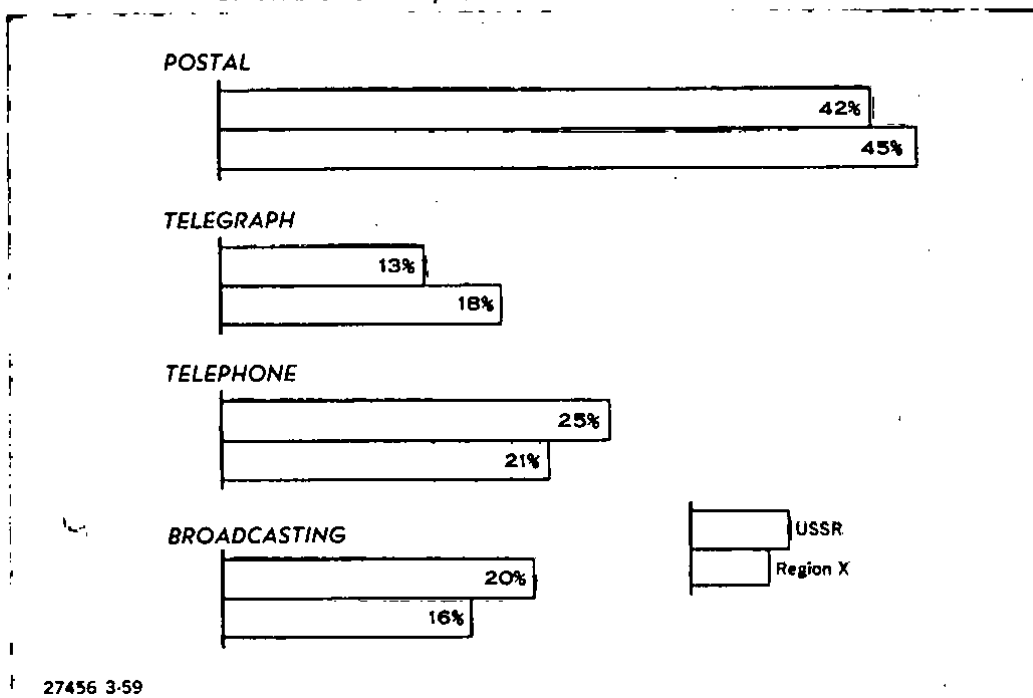
	1955 = 100				
	<u>1950</u>	<u>1955</u>	<u>1956</u>	<u>1957</u>	<u>1958</u>
USSR	67.8	100	106.4	112.1	120.7
Region X	65.1	100	106.8	115.3	123.2
Kazakhstan (Xa)	60.5	100	107.1	115.3	123.2
Central Asia (Xb)	69.4	100	106.6	115.4	123.2

The more rapid growth in Kazakhstan in these years is a reflection of the increased service volume that came about as a result of the new lands program.

The fact that communications revenue has grown at a somewhat more rapid rate in Region X than in the USSR as a whole is not indicative of a more adequately developed post and telecommunications system -- on the contrary, the level of its development in Region X is substantially below that in the USSR. This situation is illustrated to some extent by Figure 6, which shows the percentage

COMPARISON OF THE PERCENTAGE DISTRIBUTION
OF COMMUNICATIONS REVENUE IN THE USSR AND IN ECONOMIC REGION X
BY TYPE OF SERVICE, 1958—MINISTRY OF COMMUNICATIONS

Figure 6



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Table 1

Estimated Total Revenue of the Republic Ministries of Communications
of Kazakhstan and Central Asia (Region X) a/
1950 and 1955-58

	Million 1955 Rubles				
	<u>1950</u>	<u>1955</u>	<u>1956</u>	<u>1957</u>	<u>1958</u>
Region X	<u>475.3</u>	<u>729.6</u>	<u>779.6</u>	<u>841.3</u>	<u>898.8</u>
Kazakhstan (Xa)	<u>210.4</u>	<u>347.9</u>	<u>372.6 b/</u>	<u>401.0</u>	<u>428.6</u>
Central Asia (Xb)	<u>264.9</u>	<u>381.6</u>	<u>407.0</u>	<u>440.3</u>	<u>470.2</u>
Kirgiz SSR	42.6	64.1	67.5	72.2	77.6
Tadzhik SSR	37.0	50.6	50.7	52.8	56.9
Turkmen SSR	48.8	63.6	65.9	69.3	73.2
Uzbek SSR	136.5	203.3	223.0 b/	246.0	262.6

a. Revenue was computed by multiplying post and telecommunications service volumes by their estimated average unit revenue and by estimating other sources of revenue that are not reflected by service volumes. Revenue figures are available for each of the years shown in the originating office of this report. A breakdown of total revenue for 1958, by type of service, is shown in Table 2 (p. 12, below). All data are rounded to the nearest hundred thousand. Totals are derived from unrounded data and may not agree with the sum of their rounded components.

b. the average revenue per employee of the Ministry of Communications in 1956 to be 14,429 rubles in Kazakhstan and 19,526 rubles in Uzbek SSR. These figures multiplied by the number of employees in Kazakhstan and Uzbek SSR (see Table 3, p. 16, below) give a total revenue of 372.3 million rubles for Kazakhstan and 212.8 million rubles for Uzbek SSR, compared with the derived figures of 372.6 and 223.0, respectively.

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distribution of revenue in the USSR and in Region X, by type of service (see Table 2* for the 1958 revenue in Region X, by type of service). A comparison of the percent of total revenue received from postal, telephone, and telegraph services in Region X and in the USSR reflects the greater dependence on post and telegraph services in Region X. Similarly, a comparison of the percent of revenue received from broadcasting services reflects the lower level of development of broadcasting services in Region X. These observations are borne out in greater detail in the remainder of this report.

The revenue received from post and telecommunications services in Region X should show a substantial increase in the next 7 years. This estimate is based on preliminary announcements on the Seven Year Plan (1959-65), which point to a rapid expansion of most post and telecommunications services and facilities in Region X.

C. Investment.

The basic problem confronting the republic ministries of communications in Region X in developing post and telecommunications facilities is the inadequate supply of investment funds and of material and equipment. These inadequacies have seriously limited the ability of the republic ministries to perform assigned functions. The following statement by an official of the Ministry of Communications of the USSR in 1958 is believed to reflect the general attitude in the republic ministries in Region X in recent years:

For a number of years the State Planning Committee of the USSR has planned the capital investments and materials and the technical supply of organs of the Ministry of Communications on a level which is not in accord with the development of communications technology and the steadily increasing demands of the public and national economy for communications facilities. State planning committees of union republics also are not devoting sufficient attention to this subject. 5/

Investment data on post and telecommunications in Region X are incomplete. Planned capital investment for the Fourth Five Year Plan (1946-50) in Kazakhstan was 8.8 million rubles. For the Fifth Five Year Plan (1951-55), about 127 million rubles were planned, 70 million rubles of which were planned for 1955 in response to

* Table 2 follows on p. 12.

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Table 2

Estimated Revenue of the Republic Ministries of Communications
of Kazakhstan and Central Asia (Region X), by Type of Service a/
1958

	Million 1955 Rubles						
	Postal <u>b/</u>	Telephone			Telegraph <u>e/</u>	Broad- casting <u>f/</u>	Total Revenue
		Urban and Rural <u>c/</u>	Interurban <u>d/</u>	Total			
Region X	<u>400.5</u>	<u>76.4</u>	<u>111.6</u>	<u>188.0</u>	<u>166.0</u>	<u>144.3</u>	<u>898.8</u>
Kazakhstan (Xa)	<u>201.0</u>	<u>32.7</u>	<u>43.4</u>	<u>76.1</u>	<u>90.7</u>	<u>60.8</u>	<u>428.6</u>
Central Asia (Xb)	<u>199.6</u>	<u>43.7</u>	<u>68.2</u>	<u>111.9</u>	<u>75.3</u>	<u>83.5</u>	<u>470.2</u>
Kirgiz SSR	31.9	7.5	12.4	19.9	12.8	12.9	77.6
Tadzhik SSR	21.1	6.7	9.3	16.0	10.3	9.5	56.9
Turkmen SSR	30.8	7.9	11.4	19.2	12.8	10.3	73.2
Uzbek SSR	115.7	21.7	35.1	56.8	39.4	50.7	262.6

a. All data are rounded to the nearest hundred thousand. Totals are derived from unrounded data and may not agree with the sum of their rounded components.

b. Postal revenue was derived by multiplying the estimated average unit revenue received for letters, money orders, packages, and periodical publications by their volumes (see Table 4, p. 20, below, for total postal volume).

c. Computed by multiplying the annual business and home subscription fee by the midyear number of urban business and home telephones. In addition, the annual number of new urban home and business subscribers

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Table 2

Estimated Revenue of the Republic Ministries of Communications
of Kazakhstan and Central Asia (Region X), by Type of Service
1958
(Continued)

was multiplied by the installation fee for new telephones, and allowances were made for rural telephone revenue and for miscellaneous sources of revenue such as public telephone booths and fees for special service (see Table 7, p. 26, below, for the number of urban and rural telephone sets).

d. Computed by multiplying the number of interurban telephone calls (see Table 8, p. 29, below) by the estimated revenue per call. An allowance was also made for revenue derived from the lease of interurban telephone circuits.

e. The number of telegrams sent (see Table 9, p. 31, below) was multiplied by the estimated average revenue per telegram. An allowance was also made for revenue derived from the lease of telegraph circuits.

f. Computed by multiplying the midyear number of urban and rural wired loudspeakers (see Table 12, p. 37, below) and the midyear number of radiobroadcast receivers (see Table 10, p. 35, below) by their respective license fees. In addition, the number of new wired loudspeakers was multiplied by an installation fee. Allowances were also made for other sources of broadcasting revenue, including that received from television.

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requirements for service brought about by the new lands program. Under the provision of the Sixth Five Year Plan (1956-60), 300 million rubles were to be allocated for investment in post and telecommunications facilities in Kazakhstan. The Sixth Five Year Plan was discarded in 1957. Since that time, Kazakhstan has announced a planned investment figure for 1958 of 33 million rubles. 7/

An evaluation of available investment data suggests that since the end of World War II there have been rather substantial increments in planned post and telecommunications investment. The inadequacy of post and telecommunications services in Region X, even before the economic reorganization of 1957, implies that these funds have been insufficient to develop post and telecommunications facilities commensurate with the needs of the regional economy and the general public.

The investment picture in Region X has been changed somewhat by the economic reorganization. The establishment of local economic authorities (sovnarkhozes) has apparently resulted in a closer local identification with and interest in the development of post and telecommunications. For this reason, communications organs, primarily at the oblast level, are better able to draw on local sovnarkhoz resources, both material and monetary, for the development of post and telecommunications.

The contribution that local sources can make to the development of post and telecommunications has been offset somewhat by the increased investment requirements imposed by the economic reorganization. These requirements include the provision of post and telecommunications services between the sovnarkhoz and subordinate enterprises, between sovnarkhozes with related economic interests, and between sovnarkhozes and state planning committees and marketing organizations on the republic level. Before the reorganization, most enterprises in Region X were subordinate either to republic ministries or to ministries on the national level. Because of this organizational structure, interurban telecommunications facilities were developed in a radial configuration paralleling the established lines of authority and responsibility. In consequence of the reorganization of 1957 and its partial decentralization of authority and responsibility, existing interurban telecommunications facilities in Region X proved inadequate in quantity, distribution, and capacity to meet the new requirements. Under these new circumstances, republic and local communications organs in Region X as well as the Ministry of Communications of the USSR must increase the rate of investment expenditure to provide the necessary additional facilities.

At present it is not clear how successfully these investment requirements have been met in Region X. Apparently, however, part

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of the problem involves material and equipment shortages. A report from Uzbek SSR in 1958 stated that the republic government had increased appropriations for the development of post and telecommunications facilities each year but that the main problem was to obtain the necessary equipment. Another example of such a shortage is a statement of the Minister of Communications of Kazakhstan that not all of the new sovmarkhozes in Kazakhstan had adequate telecommunications service with their subordinate enterprises. He further stated that this shortcoming could be corrected in the near future provided the necessary amounts of equipment and material were received. Apparently the essential problem here is one of procurement of equipment rather than availability of investment funds.

Preliminary planning data for the new Seven Year Plan in Region X suggest that increased emphasis will be placed on developing post and telecommunications facilities. Plans for the expansion of such facilities as radiobroadcasting and television, high-capacity interurban telecommunications facilities, and automatic telegraph and telephone exchange facilities in many instances will require large capital expenditures. It is expected, therefore, that the annual rate of investment in post and telecommunications facilities in Region X through 1965 will show a substantial increase over that of previous plan periods. For Kazakhstan it is reported that investment in post and telecommunications facilities during the Seven Year Plan will be more than twice that of the preceding 7 years.

An additional factor which is indicative of higher investment rates in Region X is the increased responsibility that the republic ministries of communications are apparently assuming in providing facilities for agricultural, industrial, and construction enterprises which were formerly financed by other ministries. As stated above, a possible limiting factor to such investment expansion is the availability of material and equipment. 8/

D. Manpower.

1. Labor Force.

The total labor force of the republic ministries of communications in Region X was 50,600 employees in 1958 (see Table 3*),

* Table 3 follows on p. 16.

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Table 3

Estimated Average Annual Number of Employees of the Republic Ministries of Communications of Kazakhstan and Central Asia (Region X) a/
1950 and 1955-58

	Persons				
	<u>1950</u>	<u>1955</u>	<u>1956</u>	<u>1957</u>	<u>1958</u>
Region X	<u>40,200</u>	<u>45,400</u>	<u>47,100</u>	<u>48,900</u>	<u>50,600</u>
Kazakhstan (Xa)	<u>20,400</u> <u>b/</u>	<u>24,800</u> <u>b/</u>	<u>25,800</u> <u>b/</u>	<u>26,800</u> <u>c/</u>	<u>27,800</u> <u>c/</u>
Central Asia (Xb)	<u>19,800</u>	<u>20,600</u>	<u>21,300</u>	<u>22,100</u>	<u>22,800</u>
Kirgiz SSR	3,100 <u>d/</u>	2,800 <u>d/</u>	2,800 <u>d/</u>	2,900 <u>e/</u>	2,900 <u>e/</u>
Tadzhik SSR	2,800 <u>f/</u>	3,400 <u>f/</u>	3,600 <u>f/</u>	3,800 <u>c/</u>	4,000 <u>c/</u>
Turkmen SSR	3,800 <u>g/</u>	3,800 <u>g/</u>	4,000 <u>g/</u>	4,200 <u>c/</u>	4,400 <u>c/</u>
Uzbek SSR	10,100 <u>h/</u>	10,600 <u>h/</u>	10,900 <u>h/</u>	11,200 <u>c/</u>	11,500 <u>c/</u>

a. All data are rounded to the nearest hundred. Data include rural mailmen.

b. 9/

c. Extrapolated by applying the absolute growth shown during 1955-56 to each of these years.

d. 10/

e. Assuming a growth of 100 employees in 1957 and no change for 1958.

f. 11/

g. 12/

h. 13/

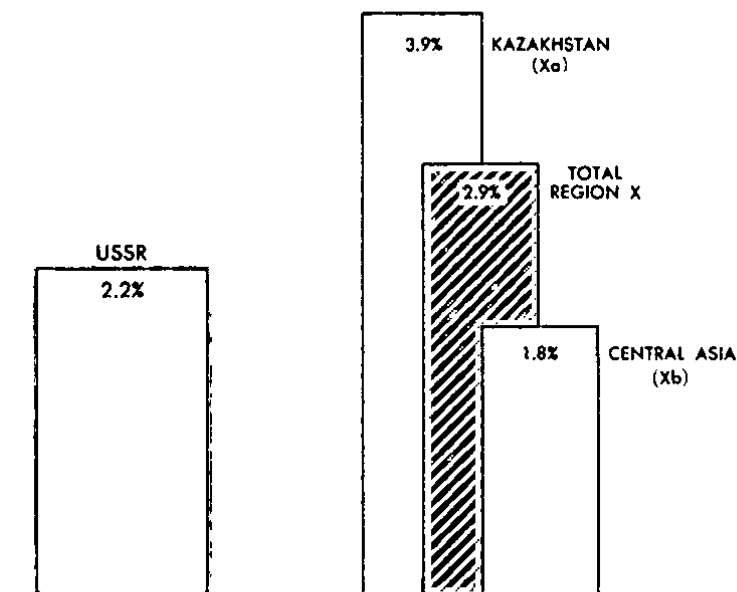
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which represents nearly 8 percent of the total labor force of the Ministry of Communications of the USSR. As illustrated in Figure 7,

Figure 7

COMPARISON OF THE AVERAGE ANNUAL RATES OF GROWTH
OF THE COMMUNICATIONS LABOR FORCE IN THE USSR AND IN ECONOMIC REGION X
1950-58—MINISTRY OF COMMUNICATIONS



27457 3-59

the average annual rate of growth of the labor force of the republic ministries since 1950 has been somewhat greater than that of the Ministry of Communications of the USSR as a whole. Within Region X, Kazakhstan has shown the greatest growth, presumably as a result of the new lands program and the consequently increased requirements for post and telecommunications service.

The distribution of the labor force of the republic ministries of communications by type of operation varies from republic to republic but is believed to be similar to that of the USSR as a whole. This distribution in Region X is believed to range from 40 to 45 percent of the labor force employed in the postal system, 35 to 40 percent in the telephone and telegraph systems, 8 to 10 percent in the broadcasting system, and about 10 percent trainees and miscellaneous.

In the normal course of developing a post and telecommunications system, the introduction of more modern automatic and

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semiautomatic equipment, which increases labor productivity, gradually reduces the annual rate of increment to the labor force. The comparatively low level of development of post and telecommunications in Region X, however, appears to rule out any significant reduction in the annual rate of growth of the labor force in the near future, even with increased automation.

2. Training.

A labor force having a variety of skills is needed to utilize existing facilities more effectively and to develop a more adequate and modern telecommunications system. In Region X the major centers for training post and telecommunications employees are located at Tashkent and Alma-Ata. An Electrotechnical Institute of Communications and a Technical School of Communications are located at Tashkent. Alma-Ata has a Technical School of Communications and also is a center for the All-Union Correspondence Technical School of Communications. In addition to these training facilities, the republic ministries of communications organize technical and administrative training courses for employees at oblast and republic centers. 14/

Available evidence suggests that the supply of technicians and engineers in Region X is far from adequate. In 1956, for instance, a complaint was registered by the Collegium of the Ministry of Communications of the USSR that "Central Asia" was not receiving its share of highly specialized communications workers. Another example is a statement made by an official of the Ministry of Communications of Kazakhstan in mid-1957 that communications organs in his republic were in serious need of aid from the Ministry of Communications of the USSR, particularly to overcome shortages of qualified personnel. Periodic reports by the Ministry of Communications of the USSR also cite most of the republics of Region X as not participating on a wide scale in the "rationalization work" of introducing suggestions. 15/

The initiation of plans thus far outlined for 1959-65 in Region X will necessitate an expansion of training facilities in order to increase the supply of technicians and engineers to operate and maintain the more complex modern equipment. In an effort to increase the number of engineers and technicians from the local population, the Ministry of Communications of the USSR reportedly has issued an order requiring republic and local communications organs to select and to send indigenous persons, preferably employees, to educational institutes. 16/

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3. Productivity.

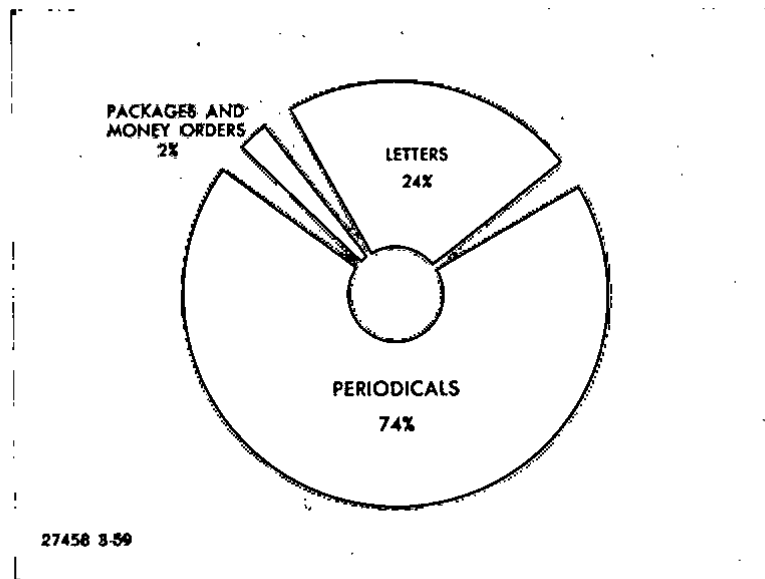
The average annual rate of growth in labor productivity of the republic ministries of communications in Region X from 1950 through 1958 was slightly more than 5 percent.* This rate of growth was about the same in both Kazakhstan and Central Asia as well as in the Ministry of Communications of the USSR as a whole:

The rapid introduction of modern post and telecommunications facilities envisaged for the 1959-65 planning period will effect a growth in labor productivity at an accelerated rate.

III. Postal Services.

Postal service is the most readily available and widely used medium of communications in Region X. In 1958, about 1.2 billion pieces of mail were handled (see Table 4**), representing about 7 percent of the total postal volume in the USSR. The service operates through a network of about 5,500 communications enterprises (see Table 5***). As shown in Figure 8, periodicals account for 74 percent of total postal volume.****

Figure 8

USSR: DISTRIBUTION OF POSTAL VOLUME IN ECONOMIC REGION X
BY TYPE OF SERVICE, 1958—MINISTRY OF COMMUNICATIONS

* Computed on the basis of the rate of growth in average annual revenue per employee, derived from Table 1, p. 10, above, and Table 3, p. 16, above.

** Table 4 follows on p. 20.

*** Table 5 follows on p. 21.

**** Text continued on p. 22.

Table 4

Estimated Total Volume of Postal Service
in Kazakhstan and Central Asia (Region X) a/
1950 and 1955-58

	Million Units				
	<u>1950</u>	<u>1955</u>	<u>1956</u>	<u>1957</u>	<u>1958</u>
Region X	<u>525</u>	<u>1,013</u>	<u>1,050</u>	<u>1,150</u>	<u>1,239</u>
Kazakhstan (Xa)	<u>217</u> b/	<u>446</u> b/	<u>412</u> b/	<u>466</u> c/	<u>502</u> d/
Central Asia (Xb)	<u>307</u>	<u>567</u>	<u>638</u>	<u>684</u>	<u>737</u>
Kirgiz SSR	49 e/	85 e/	91 e/	98 f/	105 f/
Tadzhik SSR	41 e/	74 e/	80 e/	87 f/	93 f/
Turkmen SSR	61 g/	90 g/	96 h/	102 f/	108 f/
Uzbek SSR	157 i/	318 i/	371 i/	397 j/	431 d/

a. Total volume of postal service is composed of letters, packages, periodical publications, and money orders. A breakdown of volume of postal service by these categories is available in the files of this Office. All data are rounded to the nearest million. Totals are derived from unrounded data and may not agree with the sum of their rounded components.

b. 17/

c. 18/

d. Extrapolated by applying the average annual absolute growth shown during 1950-57.

e. 19/

f. Extrapolated by applying the average annual absolute growth shown during 1950-56 to each of these years.

g. 20/

h. 21/

i. 22/

j. 23/

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Table 5

Estimated Number of Postal and Telephone and Telegraph Enterprises
in Kazakhstan and Central Asia (Region X) ^{a/}
1950 and 1955-58

	1950			1955			1956			1957			1958			Units
	Urban ^{b/}	Rural	Total	Urban ^{b/}	Rural	Total	Urban ^{b/}	Rural	Total	Urban ^{b/}	Rural	Total	Urban ^{b/}	Rural	Total	
Region X	<u>761</u>	<u>3,370</u>	<u>4,130</u>	<u>1,030</u>	<u>3,850</u>	<u>4,880</u>	<u>1,100</u>	<u>3,970</u>	<u>5,070</u>	<u>1,170</u>	<u>4,100</u>	<u>5,260</u>	<u>1,240</u>	<u>4,220</u>	<u>5,460</u>	
Kazakhstan (Xa)	<u>331</u>	<u>2,090</u>	<u>2,420</u>	<u>466</u>	<u>2,530</u>	<u>2,990</u>	<u>502</u>	<u>2,550</u>	<u>3,050</u>	<u>538</u>	<u>2,570 c/</u>	<u>3,110 c/</u>	<u>574</u>	<u>2,600 c/</u>	<u>3,170 c/</u>	
Central Asia (Xb)	<u>430</u>	<u>1,270</u>	<u>1,700</u>	<u>560</u>	<u>1,330</u>	<u>1,890</u>	<u>597</u>	<u>1,420</u>	<u>2,020</u>	<u>631</u>	<u>1,520</u>	<u>2,150</u>	<u>665</u>	<u>1,620</u>	<u>2,280</u>	
Kirgiz SSR	70	311	381	119	323	442	125	332	457	131	341 c/	472 c/	137	350 c/	487 c/	
Tadzhik SSR	49	226	275	74	226	300	84	224	308	91	225 d/	316 c/	98	226 d/	324 c/	
Turkmen SSR	102	163	265	122	169	291	124	171	295	126	173 c/	299 c/	128	175 c/	303 c/	
Uzbek SSR	209	574	783	245	610	855	264	696	960	283	782 c/	1,060 c/	302	868 c/	1,170 c/	

- a. All totals are rounded to three significant digits. Totals are derived from unrounded data and may not agree with the sum of their rounded components.
- b. Total minus rural.
- c. Extrapolated by applying the absolute growth during 1955-56 to each of these years.
- d. Assuming an increase of 1 unit for each of these years.

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In general, the quality and availability of postal service in Region X are adequate in urban areas and vary from marginal to unsatisfactory in most rural areas. Region X compares unfavorably in per capita volume of postal service with the USSR as a whole, as shown in the following tabulation*:

	Pieces of Mail Per Capita in 1958
USSR	81
Region X	52
Kazakhstan (Xa)	51
Central Asia (Xb)	53

The differences in per capita service volume between Region X and the USSR as a whole may be attributed in part to the fact that postal and transportation facilities are inadequate to serve the vast rural area in Region X. Another possible factor is a less active demand for postal service by the various native groups in Region X than by the rest of the USSR.

Steps are being taken in Region X to improve postal service. They consist of expanding the number of enterprises and speeding up the movement of mail through the use of mobile branch communications offices and airplanes. In Kazakhstan, airmail service has been established from Alma-Ata to all oblast and large urban centers. In Tadzhik SSR, airmail service was initiated in 1958 to rayon centers. Service is being improved by mechanization of mail-handling processes at large postal centers, by decentralization of printing points for periodicals, and by improvement in delivery schedules. It is believed that the postal system in Region X will continue to develop along these lines in the future and that most deficiencies will be overcome during the course of the Seven Year Plan. 25/

IV. Telephone and Telegraph Services.

A. Telephone.

The development of the telephone system in Region X, consisting of urban, rural, and interurban networks, lags behind the service

* All per capita relationships presented in this report are based on population projections through 1958 of announced population statistics for 1950 and 1956, using the average annual rates of growth.

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requirements of the region. The telephone system is deficient not only in terms of availability of service but also in technical quality and in reliability. Region X has only 7 percent of the total number of telephone sets in the USSR and handles only 6.6 percent of the total number of interurban calls made in the country. The telephone system of Region X compares unfavorably in almost every way with that of the USSR as a whole (which meets only the minimal requirements of the economy).

1. Urban and Rural.

Rayon centers act as the focal points for rural telephone networks and serve as the exchange centers for both intrarayon and interurban telephone service. Rayon centers and other populated points of comparable or larger size are considered to be part of the urban telephone network and are interconnected, by way of zonal centers, with the interurban telephone network.

Because both the urban and the rural areas of Region X are vastly different from almost all other urban and rural areas of the USSR, comparisons of telephone facilities may not be wholly meaningful. Even so, the following explanations contain some quantitative significance. The two tabulations which follow illustrate the comparative status of urban and rural telephone services in Region X. The number of telephone sets per 1,000 persons in the USSR and in Region X in 1958 was as follows:

	Telephone Sets per 1,000 Persons		
	<u>Urban</u>	<u>Rural</u>	<u>Total</u>
USSR	22	3.0	11
Region X	16	1.6	6.9
Kazakhstan (Xa)	15	2.1	7.4
Central Asia (Xb)	18	1.2	6.6

Automatic telephone exchange capacity as a percent of total exchange capacity in the USSR and in Region X in 1956 was as follows:

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	Percent		
	Urban	Rural	Total
USSR	50	4	42
Region X	30	11	27
Kazakhstan (Xa)	28	10	24
Central Asia (Xb)	31	13	29

These tabulations show that, with the exception of automation in rural areas, the level of development of telephone networks in Region X is substantially below that in the USSR as a whole. Although the urban telephone network in Region X is deficient in comparison with that in the USSR, it does not represent as serious a deficiency as the rural network. As shown in Table 6,* telephone service not only is completely lacking in many rural areas but also is of questionable quality and very limited quantity in those areas where it does exist. Furthermore, internal telephone systems are virtually nonexistent in agricultural enterprises and kolkhozes.

The telephone facilities operated by the republic ministries of communications in Region X are shown in Table 7.** This table, however, does not give a complete inventory of such facilities within the region. Before the economic reorganization of 1957, numerous industrial and construction enterprises in Region X operated functional telephone networks independent of the republic ministries. The total exchange capacity of these functional telephone networks compared with that of the networks of the republic ministries in Region X in 1955 was as follows*** 26/:

	Telephone Numbers	
	Functional	Ministry of Communications
Region X	109,600	150,700
Kazakhstan (Xa)	47,400	71,300
Central Asia (Xb)	62,200	79,400

* Table 6 follows on p. 25.

** Table 7 follows on p. 26.

*** Text continued on p. 27.

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Table 6

Telephone Service in Rural Areas in Kazakhstan and Central Asia (Region X)
by Type of Agricultural Unit a/
1956

	Units Having Telephone Service							
	Village Soviets		Sovkhozes		Machine Tractor Stations		Kolkhozes	
	Units	Percent	Units	Percent	Units	Percent	Units	Percent
Region X	<u>3,206</u>	<u>78.9</u>	<u>714</u>	<u>83.4</u>	<u>924</u>	<u>98.0</u>	<u>4,306</u>	<u>73.0</u>
Kazakhstan (Xa)	<u>1,326</u>	<u>63.6</u>	<u>544</u>	<u>86.6</u>	<u>451</u>	<u>96.4</u>	<u>1,882</u>	<u>72.4</u>
Central Asia (Xb)	<u>1,880</u>	<u>94.9</u>	<u>170</u>	<u>74.6</u>	<u>473</u>	<u>99.4</u>	<u>2,424</u>	<u>73.4</u>
Kirgiz SSR	423	94.8	39	67.2	78	98.7	369	52.7
Tadzhik SSR	221	86.3	27	81.8	64	97.3	279	69.8
Turkmen SSR	253	95.1	26	63.4	73	100.0	288	96.0
Uzbek SSR	983	97.2	78	81.2	258	100.0	1,488	78.3

a. 27/. Including only those agricultural units which have telephone service with their rayon centers.

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Table 7

Estimated Number of Telephone Sets
Connected to Exchanges Operated by the Republic Ministries of Communications
of Kazakhstan and Central Asia (Region X) a/
1950 and 1955-58

	Thousand Units														
	1950			1955			1956			1957			1958		
	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total
Region X	<u>85</u>	<u>10.5</u>	<u>95.5</u>	<u>115</u>	<u>16.8</u>	<u>131.8</u>	<u>126</u>	<u>19.4</u>	<u>145.4</u>	<u>133.5</u>	<u>21.6</u>	<u>155.1</u>	<u>139.9</u>	<u>23.8</u>	<u>163.7</u>
Kazakhstan (Xa)	<u>38</u>	<u>5.4</u>	<u>43.4</u>	<u>51</u>	<u>9.0</u>	<u>60.0</u>	<u>56</u>	<u>10.1</u>	<u>66.1</u>	<u>58.2 b/</u>	<u>11.2 c/</u>	<u>69.4</u>	<u>60.4 d/</u>	<u>12.3 c/</u>	<u>72.7</u>
Central Asia (Xb)	<u>47</u>	<u>5.1</u>	<u>52.1</u>	<u>64</u>	<u>7.8</u>	<u>71.8</u>	<u>70</u>	<u>9.3</u>	<u>79.3</u>	<u>75.3</u>	<u>10.4</u>	<u>85.7</u>	<u>79.5</u>	<u>11.5</u>	<u>91.0</u>
Kirgiz SSR	7	0.7	7.7	11	1.2	12.2	12	1.4	13.4	13.0 <u>c/</u>	1.6 <u>c/</u>	14.6	14.0 <u>c/</u>	1.8 <u>c/</u>	15.8
Tadzhik SSR	7	0.8	7.8	9	1.3	10.3	10	1.5	11.5	10.5 <u>e/</u>	1.6 <u>e/</u>	12.1	11.0 <u>e/</u>	1.7 <u>e/</u>	12.7
Turkmen SSR	8	0.9	8.9	12	1.1	13.1	13	1.5	14.5	13.8 <u>e/</u>	1.6 <u>e/</u>	15.4	14.6 <u>e/</u>	1.7 <u>e/</u>	16.3
Uzbek SSR	25	2.7	27.7	32	4.2	36.2	35	4.9	39.9	38.0 <u>f/</u>	5.6 <u>c/</u>	43.6	39.9 <u>g/</u>	6.3 <u>c/</u>	46.2

- b. Assuming the same absolute increase for 1957 as that planned for 1958.
c. Extrapolated by applying the absolute growth shown during 1955-56 to each of these years.
d. 29/
e. Extrapolated by applying the average annual absolute growth shown during 1950-56 to each of these years.
f. 30/
g. Extrapolated by applying the average annual absolute growth shown during 1950-57.

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The exchange capacity of the functional telephone network in 1955 represented 42 percent of the total available exchange capacity in Region X. The current status of these functional networks is uncertain. There is evidence that in other regions the Ministry of Communications of the USSR is slowly gaining control of functional networks belonging to ministries that were abolished under the provisions of the economic reorganization of 1957. Similar action, if not already initiated, may be expected in Region X. When such action is completed the republic ministries of communications will be able to utilize more effectively the total exchange capacity of Region X. Furthermore, the ability of the ministries to meet requirements for telephone service should be augmented to the extent that excess functional capacity can be diverted to other users.

The Seven Year Plan for the Ministry of Communications of the USSR calls for increasing the capacity of urban telephone exchanges 1.5 times, primarily through the use of automatic exchange equipment, and for the installation of telephone facilities in all rural areas by the end of 1965. Plans state that the highest rate of development of urban telephone facilities will take place in those republics whose ratio of telephones per 100 persons is particularly low. Specifically mentioned are the Kazakh, Kirgiz, Tadzhik, and Uzbek SSR's. In Uzbek SSR alone it is planned to increase the automatic exchange capacity of urban areas by more than 100,000 numbers by the end of 1965. 31/

If the growth in urban exchange capacity in the republics of Region X is at all comparable to that indicated by the Seven Year Plan, the urban telephone network of Region X will be greatly improved. Whether telephone facilities will be installed in all rural areas of Region X by the end of 1965 cannot be determined. The geographical features of the rural area of Region X would make the installation of telephone facilities extremely costly. Nevertheless, the rural telephone network will probably be substantially improved over the course of the next 7 years.

2. Interurban.

The interurban telephone service in the USSR interconnects republic, oblast, and rayon centers with other populated points through a network of interurban telephone exchanges and common telecommunications facilities. The republic capitals and oblast centers in Region X serve as the main exchange centers, with Tashkent, one of the largest communications centers in the USSR, providing exchange outlets for Region X to the interurban network of other areas of the USSR.

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Interurban telephone service is available on a limited basis to all oblast centers and major cities and to most rayon centers in Region X. As a result of service limitations, the vast majority of the available interurban telephone service is utilized by the Party, the government, and government enterprises.

The volume of interurban telephone service in Region X is shown in Table 8.* A comparison of the relative service volumes (the number of interurban telephone calls per 100 persons) in 1958 of Region X and the USSR, as shown in the following tabulation, reveals a substantial difference in the quantity of service provided.

	Telephone Calls per 100 Persons
USSR	78
Region X	46
Kazakhstan (Xa)	44
Central Asia (Xb)	48

The difference shown between the service volumes per 100 persons in the USSR and in Region X, especially when viewed in the light of the marginal nature of interurban telephone service in the USSR, illustrates the low level of development of interurban telephone service in Region X.

The shortcomings of interurban telephone service in Region X can be attributed in the main to the lack of interurban exchange capacity and the lack of circuit capacity on common telecommunications facilities. Added to these limitations are the poor technical quality of many interurban circuits, the limited hours of operation of manual interurban exchanges at oblast and rayon centers, and the related problem of inadequate automation in exchange facilities. Region X was recently cited by the Ministry of Communications of the USSR as an area where the transfer of interurban telephone circuits to semiautomatic working has been particularly unsatisfactory. The only semiautomatic interurban telephone circuits presently in use in Region X interconnect Alma-Ata, Frunze, and Tashkent. 32/

The Minister of Communications of Uzbek SSR has stated that the chief task during 1959-65 is the development of the interurban telephone network. Plans for expanding common telecommunications

* Table 8 follows on p. 29.

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Table 8

Estimated Number of Interurban Telephone Calls Made
in Kazakhstan and Central Asia (Region X) a/
1950 and 1955-58

	Million Units				
	<u>1950</u>	<u>1955</u>	<u>1956</u>	<u>1957</u>	<u>1958</u>
Region X	<u>7.0</u>	<u>9.2</u>	<u>9.7</u>	<u>10.2</u>	<u>10.9</u>
Kazakhstan (Xa)	<u>2.4</u>	<u>3.4</u>	<u>3.7</u>	<u>4.0</u> b/	<u>4.3</u> b/
Central Asia (Xb)	<u>4.6</u>	<u>5.8</u>	<u>6.0</u>	<u>6.2</u>	<u>6.6</u>
Kirgiz SSR	0.6	0.9	1.0	1.1 b/	1.2 b/
Tadzhik SSR	0.7	0.8	0.8	0.8 c/	0.9 c/
Turkmen SSR	0.9	1.0	1.0	1.0 c/	1.1 c/
Uzbek SSR	2.4	3.1	3.2	3.3 b/	3.4 b/

All data are rounded to the nearest hundred thousand.

b. Extrapolated by applying the absolute growth shown during 1955-56 to each of these years.

c. Extrapolated, using graphic analysis.

50X1

facilities in Region X will provide the necessary circuit capacity base needed for expanding interurban exchange capacity and for expanding the use of semiautomatic circuits.

One of the most important results of expanding the interurban telephone network in Region X will be the provision of service responsive to the new pattern of service requirements that has grown out of the economic reorganization. The strategic significance of an extensive interurban telephone network should not be overlooked, because the armed forces frequently use Ministry of Communications facilities and, in times of emergency, have the authority to commandeer such facilities as needed. Thus a more extensive interurban telephone network will provide the armed forces with a reserve telecommunications resource of greater capacity and flexibility, above and beyond its normal share of jointly constructed or jointly used facilities.

S-E-C-R-E-T

B. Telegraph.

In Kazakhstan and Central Asia the need for rapid electrical communications to interconnect widely separated points can be satisfied most economically by regular telegraph service. This service is feasible because it can be established with a minimum of investment in terminal equipment and in common telecommunications facilities.

Regular telegraph service, consequently, has become the most widely used mode of rapid electrical communication by all sectors of the economy in Region X. This region accounts for about 9 percent of total telegraph traffic in the USSR. Service is available to all rayon, oblast, and republic centers as well as to*most populated points of strategic or economic significance. The more sophisticated forms of telegraphic communications, subscriber telegraph and facsimile, require more elaborate terminal and common telecommunications facilities and therefore are less fully developed.

As shown in Table 9,* there has been a substantial difference between Kazakhstan and Central Asia in the growth of telegraph traffic volume since 1950 and especially since 1954. The volume of telegrams sent in Kazakhstan increased about 28 percent from 1954 through 1958, while for the same period in Central Asia the volume actually decreased by about 1 percent.

A similar disparity between the two areas exists in service volumes: in Kazakhstan there were 107 telegrams sent per 100 persons in 1958, while in Central Asia there were only 63 telegrams sent per 100 persons. The number of telegrams sent per 100 persons in Kazakhstan is somewhat greater than that in the USSR as a whole, in which there were 101 telegrams sent per 100 persons in 1958. The main reasons for the disparity in telegraph service between Kazakhstan and Central Asia are the rapidly expanding level of economic activity in Kazakhstan and the nonavailability of telephone service. Another factor may be that a relationship exists between the level of cultural development of an area (based on its ethnic composition) and its propensity to communicate: 60 percent of the population in Kazakhstan is estimated to be of European origin, whereas only 25 percent of the population in Central Asia is estimated to be of European origin.

Other forms of telegraph service, subscriber telegraph and facsimile, are available in Region X to a limited extent. It is believed that most of the major industrial centers have limited subscriber

* Table 9 follows on p. 31.

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Table 9

Estimated Number of Telegrams Sent
in Kazakhstan and Central Asia (Region X) a/
1950 and 1954-58

	Million Units					
	<u>1950</u>	<u>1954</u>	<u>1955</u>	<u>1956</u>	<u>1957</u>	<u>1958</u>
Region X	<u>13.6</u>	<u>17.2</u>	<u>18.0</u>	<u>18.3</u>	<u>18.9</u>	<u>19.4</u>
Kazakhstan (Xa)	<u>6.6</u>	<u>8.3</u> b/	<u>9.4</u>	<u>9.8</u>	<u>10.2</u> c/	<u>10.6</u> c/
Central Asia (Xb)	<u>7.0</u>	<u>8.9</u>	<u>8.6</u>	<u>8.5</u>	<u>8.7</u>	<u>8.8</u>
Kirgiz SSR	1.1	1.4 d/	1.4	1.4	1.4 e/	1.5 e/
Tadzhik SSR	1.2	1.3 d/	1.3	1.2	1.2 e/	1.2 e/
Turkmen SSR	1.3	1.7 f/	1.5	1.5	1.5 e/	1.5 e/
Uzbek SSR	3.4	4.5 g/	4.4	4.4	4.6 h/	4.6 e/

a. All data are rounded to the nearest hundred thousand.

b. 35/

c. Extrapolated by applying the absolute growth shown during 1955-56 to each of these years.

d. Interpolated, using graphic analysis.

e. Extrapolated, using graphic analysis.

f. 36/

g. 37/

h. 38/

50X1

telegraph facilities and that all republic capitals and the more important centers of economic activity in northern Kazakhstan have facsimile facilities.

Future developments in telegraphic communications in Region X will be directed toward automatization of regular telegraph exchange facilities to improve efficiency in the relaying of telegraph traffic and toward expansion of subscriber telegraph service to expedite the flow of operational telegraph traffic.

The expansion of subscriber telegraph facilities has taken on increased importance since the economic reorganization. The transfer of responsibility to the sovnarkhozes has made it necessary that the sovnarkhoz in each new economic area have a documentary form of communication with its subordinate enterprises, with other sovnarkhozes

S-E-C-R-E-T

having related economic interests, and with state planning committees and marketing organizations of the republic, for purposes of operational and administrative control and coordination. It is in this field of telegraphic communications that the greatest emphasis will be placed in Region X. 39/

V. Broadcasting.

Broadcasting services provide the Communist Party and the Soviet government with one of the most important means for dissemination of propaganda to the general public.* A byproduct of broadcasting is public entertainment.

Broadcasting service in Region X is not as well developed as that in the USSR as a whole. Region X, which has about 11 percent of the total population of the USSR, has only 7 percent of the total number of broadcast reception points. This discrepancy is partly explained by the topography and low population density of Region X, which make the provision of broadcasting services extremely expensive in many areas.

The wire-diffusion network is the most extensive of the broadcasting services in Region X, accounting for about 72 percent of the total number of reception points, followed by radiobroadcasting with 25 percent and television with about 3 percent. Television has grown phenomenally since the beginning of 1956 and is the mode of broadcasting on which the greatest emphasis is currently being placed.

A. Radiobroadcasting.

Domestic radiobroadcasting in Region X has not been given in recent years the priority given to wire diffusion and television. This is explained partly by its relatively high cost compared with wire diffusion and partly by its relative ineffectiveness compared with television. Another factor is the desire of Soviet officials to have a broadcast reception base oriented toward receivers that are not subject to penetration by foreign broadcasting.

* The republic ministries of communications in Region X are responsible for the operation and maintenance of the broadcasting facilities in their respective areas. The responsibility for program content and over-all supervision of the broadcasting system is vested in the state committee for radiobroadcasting and television of each republic. Each committee in turn is responsible to its republic council of ministers.

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The domestic radiobroadcasting network of Region X is made up of low-frequency, medium-frequency, high-frequency, and very-high-frequency transmitters and their associated studios. This network provides service to more than 700,000 radiobroadcast receivers (see Table 10*). In Central Asia, radiobroadcasting facilities, with one exception, are found only at republic capitals. Kazakhstan has more extensive radiobroadcasting facilities. In addition to the major radiobroadcasting center located at Alma-Ata, each oblast center in Kazakhstan has a studio and/or a transmitter associated with it. The locations of radiobroadcasting facilities, both domestic and international, are shown in Figure 9.**

The domestic transmitting facilities in Region X transmit both national programs, which originate from Moscow studios, and regional programs, which originate from republic and oblast studios. Each of these studios must devote up to half of its broadcasting time to Russian language programs regardless of the native language of the area served.

Problems facing the domestic radiobroadcasting network in Region X are manifold. Foremost are the vast area to be served, the topographic and climatic conditions which adversely affect the propagation of radio waves, the sparsity of population in large portions of the region, and the multitude of native languages. The existing radiobroadcasting network is inadequate to cope with most of these problems.

The most basic shortcoming is the lack of adequate transmitting facilities to serve the outlying areas of the republics. Furthermore, the power of existing transmitting facilities is frequently too low to provide coverage to the assigned service areas. This inadequacy is compounded by the irregularity of the linguistic and political boundaries which in some areas cause much of the transmitted energy to be dissipated outside the intended service areas. Other serious shortcomings are the shortness of the broadcasting days and the subordination of broadcasting in local native languages to that in Russian. 40/

The inadequacy of radiobroadcasting service in Region X is further reflected, as shown below, in the ratio of radiobroadcast receivers per 1,000 persons.

* Table 10 follows on p. 35.

** Following p. 34.

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	Radiobroadcast Receivers per 1,000 Persons		
	<u>Urban</u>	<u>Rural</u>	<u>Total</u>
USSR	78	20	46
Region X	57	15	30
Kazakhstan (Xa)	44	19	29
Central Asia (Xb)	68	12	30

Tentative announcements of the Seven Year Plan state that radiobroadcasting transmitting facilities will be expanded in Region X by the construction of powerful low-frequency and medium-frequency transmitters in areas where existing facilities do not provide high-quality reception. Frequency modulated (FM) radiobroadcasting will also receive increased attention in the future. In 1958 the first such facility was put into operation at Tashkent. Similar FM facilities can be expected to be installed at other republic capitals of Region X during the next 7 years. 41/

In spite of plans to expand the radiobroadcasting network, there has been no evidence of intent to expand the reception base at a more rapid rate than in the past.

The international radiobroadcasting facilities located in Region X are considered to be well developed, combining high transmission power and proximity to target areas. As shown on Figure 9,* facilities are located at Tashkent and Stalinabad, comprising two high-frequency transmitters and a studio at each location.

The primary target areas of international radiobroadcasting from Region X are Sinkiang Province in Communist China, Iran, Afghanistan, India, and Pakistan. As shown in Table 11,** programs are broadcast to these areas in 6 languages for a total of 42 hours per week.

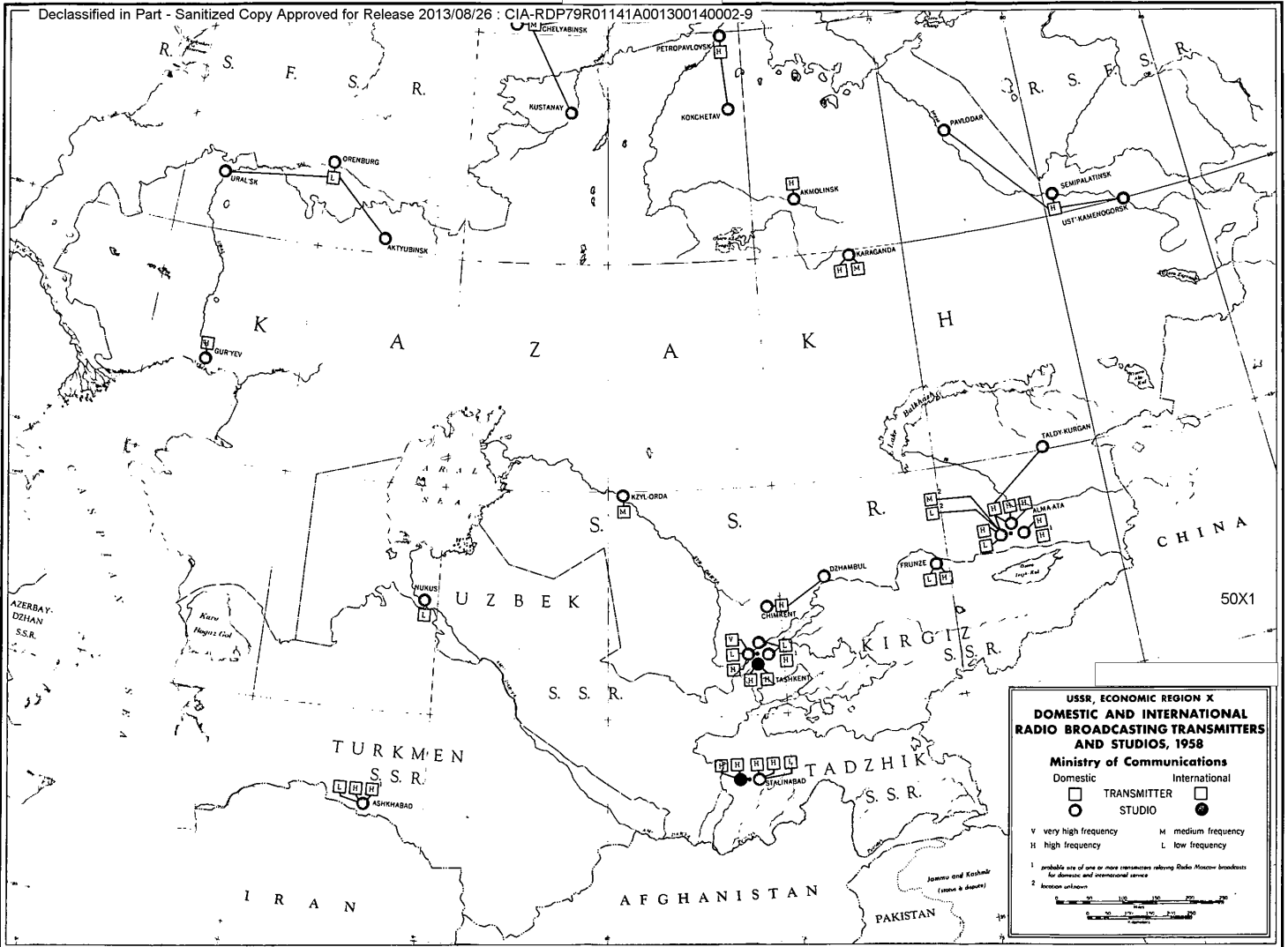
There are no indications of plans to expand international broadcasting facilities in Region X. Any future expansion will be contingent on political considerations.

B. Wire Diffusion.

The wire-diffusion network in Region X, as in the rest of the USSR, is the most widespread of the broadcasting mediums. Its

* Following p. 34.

** Table 11 follows on p. 36.



S-E-C-R-E-T

Table 10

Estimated Number of Radiobroadcast Receivers
in Kazakhstan and Central Asia (Region X) a/
1950 and 1955-58

	Thousand Units														
	1950			1955			1956			1957			1958		
	Urban <u>b/</u>	Rural	Total	Urban <u>b/</u>	Rural	Total	Urban <u>b/</u>	Rural	Total	Urban <u>b/</u>	Rural	Total	Urban <u>b/</u>	Rural	Total
Region X	<u>68</u>	<u>14</u>	<u>82</u>	<u>282</u>	<u>116</u>	<u>398</u>	<u>347</u>	<u>151</u>	<u>498</u>	<u>403</u>	<u>189</u>	<u>592</u>	<u>462</u>	<u>227</u>	<u>689</u>
Kazakhstan (Xa)	<u>14</u>	<u>5</u>	<u>19</u>	<u>96</u>	<u>46</u>	<u>142</u>	<u>125</u>	<u>68</u>	<u>193</u>	<u>150</u>	<u>90 c/</u>	<u>240 d/</u>	<u>177</u>	<u>112 c/</u>	<u>289 e/</u>
Central Asia (Xb)	<u>54</u>	<u>9</u>	<u>63</u>	<u>186</u>	<u>70</u>	<u>256</u>	<u>222</u>	<u>83</u>	<u>305</u>	<u>253</u>	<u>99</u>	<u>352</u>	<u>285</u>	<u>115</u>	<u>400</u>
Kirgiz SSR	3	1	4	24	9	33	27	13	40	30	17 <u>c/</u>	47 <u>c/</u>	33	21 <u>c/</u>	54 <u>c/</u>
Tadzhik SSR	3	2	5	23	6	29	28	5	33	31	6 <u>f/</u>	37 <u>c/</u>	34	7 <u>f/</u>	41 <u>c/</u>
Turkmen SSR	5	1	6	23	9	32	28	10	38	32	12 <u>g/</u>	44 <u>c/</u>	36	14 <u>e/</u>	50 <u>c/</u>
Uzbek SSR	43	5	48	116	46	162	139	55	194	160	64 <u>c/</u>	224 <u>g/</u>	182	73 <u>c/</u>	255 <u>e/</u>

a. All data are rounded to the nearest thousand.

b. Total minus rural.

c. Extrapolated by applying the absolute growth shown during 1955-56 to each of these years.

d. 43/

e. Extrapolated by applying the average annual absolute growth shown during 1955-57.

f. Assuming a growth of 1,000 units for each of these years.

g. 44/

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Table 11

Weekly Soviet International Radiobroadcasting Output
from Kazakhstan and Central Asia (Region X) to Foreign Audiences a/
1958

<u>Area, Direction, and Language</u>	<u>Hours per Week</u>
From Tashkent	<u>28</u>
To Sinkiang	
In Uighur	7
To Iran and Afghanistan	
In Persian	7
To India and/or Pakistan	
In Urdu	7
In English	7
From Stalinabad	<u>14</u>
To Iran and Afghanistan	
In Persian	7
In Tadzhik	7
Total	<u><u>42</u></u>

a. 45/. As of November 1958.

preeminence over other forms of broadcasting is primarily a reflection of the cost differentials and control advantages associated with closed circuit ("captive audience") broadcasting.

The growth of the wire-diffusion network in Region X has been sharp, increasing from less than 500,000 wired loudspeakers in 1950 to slightly more than 2 million by the end of 1958 (see Table 12*).

* Table 12 follows on p. 37.

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Table 12

Estimated Number of Wired Loudspeakers
in Kazakhstan and Central Asia (Region X) a/
1950 and 1955-58

	Thousand Units														
	1950			1955			1956			1957			1958		
	Urban b/	Rural	Total	Urban b/	Rural	Total	Urban b/	Rural	Total	Urban b/	Rural	Total	Urban b/	Rural	Total
Region X	<u>306</u>	<u>185</u>	<u>491</u>	<u>559</u>	<u>718</u>	<u>1,277</u>	<u>623</u>	<u>904</u>	<u>1,527</u>	<u>691</u>	<u>1,103</u>	<u>1,794</u>	<u>758</u>	<u>1,298</u>	<u>2,056</u>
Kazakhstan (Xa)	<u>161</u>	<u>94</u>	<u>255</u>	<u>272</u>	<u>283</u>	<u>562</u>	<u>308</u>	<u>351</u>	<u>659</u>	<u>341</u>	<u>419 c/</u>	<u>760 d/</u>	<u>372</u>	<u>487 c/</u>	<u>852 e/</u>
Central Asia (Xb)	<u>145</u>	<u>91</u>	<u>236</u>	<u>280</u>	<u>435</u>	<u>715</u>	<u>315</u>	<u>553</u>	<u>868</u>	<u>350</u>	<u>684</u>	<u>1,034</u>	<u>386</u>	<u>811</u>	<u>1,197</u>
Kirgiz SSR	28	18	46	57	62	119	63	72	135	71	86 f/	157 g/	78	98 f/	176 e/
Tadzhik SSR	21	14	35	39	49	88	44	61	105	49	73 c/	122 c/	54	85 c/	139 c/
Turkmen SSR	28	11	39	51	43	94	54	53	107	55	72 h/	127 i/	58	89 h/	147 h/
Uzbek SSR	68	48	116	133	281	414	154	367	521	175	453 c/	628 c/	196	539 c/	735 c/

- a. All data are rounded to the nearest thousand.
- b. Total minus rural.
- c. Extrapolated by applying the absolute growth shown during 1955-56 to each of these years.
- d. 47/
- e. Extrapolated by applying the average annual absolute growth shown during 1955-57.
- f. Computed by assuming the same increase in the proportion of rural to total in 1957 and 1958 as that shown in 1955 and 1956.
- g. 48/
- h. 49/
- i. 50/

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In spite of this rapid growth, the 1958 figure of more than 2 million represents only 87 loudspeakers per 1,000 persons in contrast to 131 loudspeakers per 1,000 persons for the USSR as a whole.

The need for further expansion of the wire-diffusion network is not restricted to any one republic or to urban or rural areas. In contrast to the distribution of other post and telecommunications facilities, the wire-diffusion network of Region X, measured on a per capita basis, is rather evenly distributed among the various republics. Similarly, the distribution of loudspeakers between urban and rural areas throughout Region X, measured on a per capita basis, is quite even.

Numerous problems are associated with the development of the wire-diffusion network of Region X as a result of the pattern of distribution of population and the topography of the region. In many remote and relatively inaccessible rural areas the cost of constructing and maintaining wireline facilities per wired loudspeaker is extremely expensive if not prohibitive. The cost of installing a wired loudspeaker in mountainous areas in Tadzhik SSR is reported to be 10 times greater than that in more level areas. 51/

Aside from cost considerations, the wire-diffusion networks of Region X reportedly experience many operational problems. These problems, as in other regions of the USSR, involve the inefficient utilization of facilities, the interruption of service resulting from equipment and power failures, and the idleness of facilities in need of replacement parts. Such problems are being resolved by automatization and by the consolidation of servicing of wire-diffusion and electrical communications.

The most recent innovation in the wire-diffusion network has been the development of a multiprogram system. This represents something of a concession to Soviet consumers, as one of the most frequent criticisms made of the wire-diffusion network is the lack of program selection. A multiprogram system has been introduced in Ashkhabad, and a similar system is under construction in Tashkent. All republic capitals of Region X are to have multiprogram wire-diffusion facilities by the end of 1965. 52/

Plan announcements thus far released for the Seven Year Plan show the intention of completing the wire-diffusion network by the end of 1965 (Uzbek SSR plans to complete its network by the end of 1959). Fulfillment of this plan is somewhat doubtful because many rural areas not now served by wire diffusion can and will be more economically served by the radiobroadcasting network. It is reasonable to expect that, where cost considerations are not overriding, the

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wire-diffusion network of Region X will be virtually completed in all urban areas and in the more heavily populated rural areas by the end of 1965. 53/

C. Television.

. Television has been recognized in the USSR as the most effective medium of mass communication. Region X, which is second only to the European portions of the USSR in the development of television, currently has 17 television stations in operation. As shown in Figure 10,* 8 of these stations are major television stations having studio facilities, and 9 are relay stations which retransmit, by means of "off-the-air" pickup, the programs of major stations.

Although the television transmission base in Region X is comparatively well developed, the reception base is estimated to consist of less than 100,000 television receivers. The small size of this base is believed to reflect a temporary lag in the supply and distribution of television receivers following the rapid expansion of transmitting facilities which began in 1956. 54/

Television facilities are concentrated largely in and around the republic capitals of Region X and the major cities of northern Kazakhstan. A unique television facility worthy of note is a relay station located at Krasnovodsk. This relay station allegedly receives and retransmits television programs originating from Baku, located about 200 miles across the Caspian Sea. Although this relay station may be serviced by means of tropospheric scatter facilities, it is believed that propagational characteristics over water at that latitude combined with high-gain reception antennas make such a phenomenon possible. 55/

One of the most significant television developments in Region X has been the introduction in 1958 of network television service between Alma-Ata, Frunze, and Tashkent. This network service was made possible by the use of microwave radio relay facilities. By the end of 1959, similar microwave facilities will be completed between Tashkent and the two remaining republic capitals of Stalinabad and Ashkhabad. This will enable all republic capitals in Region X to be joined by network television service. 56/

The future development of television in Kazakhstan and Central Asia will be directed toward a more complete television network service, expanding the transmission base (as shown by television stations planned and under construction in Figure 10*) and enlarging the

* Following p. 40.

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reception base. Microwave radio relay lines for network television service will join Region X with the Transcaucasus republics, Moscow, the Urals, and Siberia.* The completion of these microwave facilities, believed to be included in the new Seven Year Plan for a nationwide television network, will permit Region X to exchange programs with all important areas of the USSR.

VI. Common Telecommunications Facilities.

Common telecommunications facilities provide the transmission mediums by which telephone, telegraph, and broadcasting services are exchanged between two or more points. The common facilities used in Region X consist of open wirelines, multiconductor cable, microwave radio relay, and point-to-point radio. These facilities are used in varying degrees in both mainline (interrepublic and interoblast) and secondary (intraoblast) telecommunications service.

The common facilities in mainline use in Region X meet, for the most part, only minimal economic requirements for telecommunications circuit capacity. Open wirelines are the facilities most extensively used in mainline service, and many of these are known to use techniques for multiplying circuit capacity. These facilities are supplemented in northern Kazakhstan by a number of multiconductor cable lines and in the southeastern portion of Region X by microwave radio relay lines. There are also a number of point-to-point radio circuits in mainline use. These circuits are used principally to handle telecommunications traffic that cannot be accommodated by other common facilities and to act as reserve facilities.

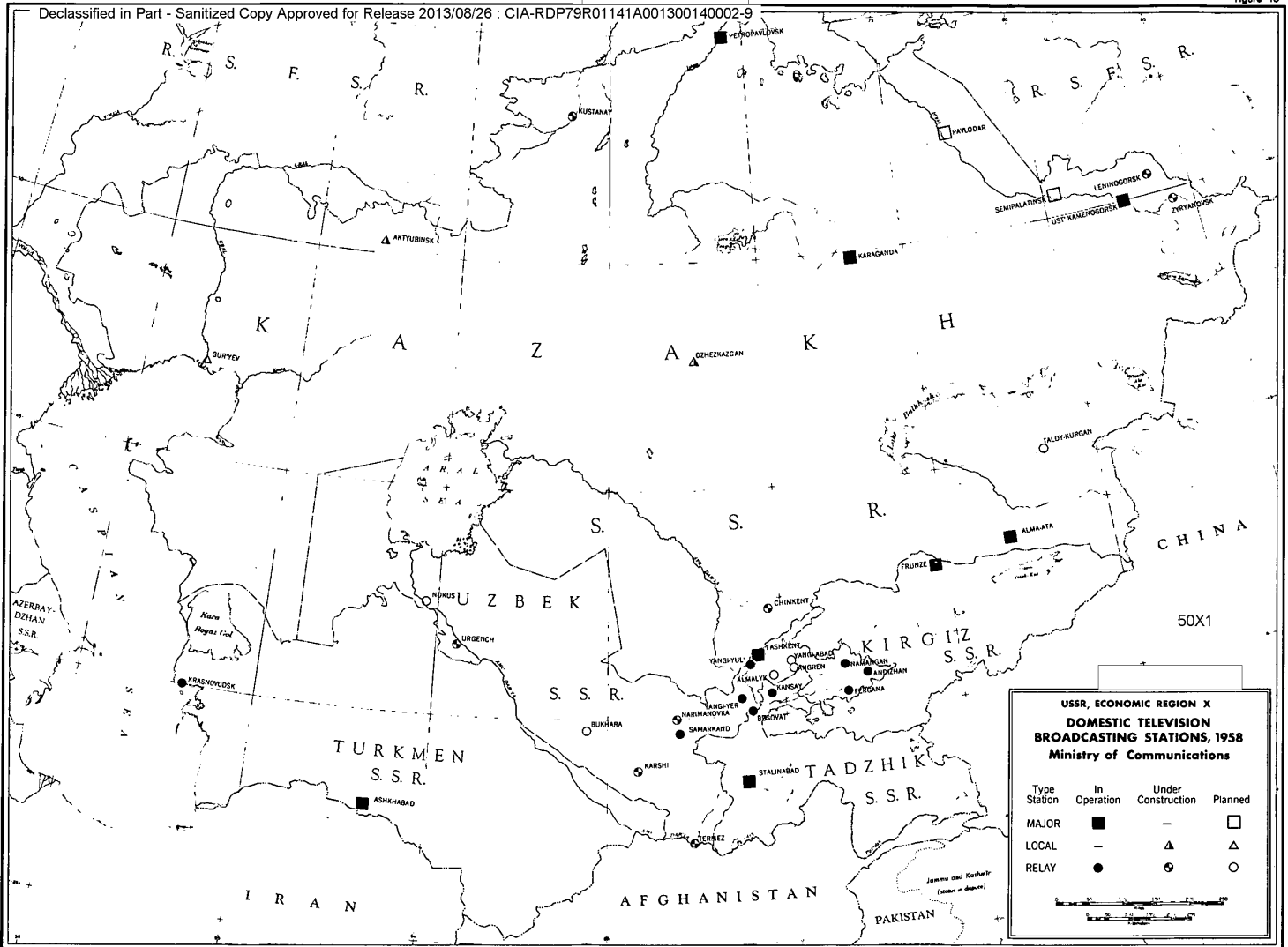
The high cost per channel for the construction of reliable common telecommunications facilities for secondary use has forced the rural areas of Region X to depend largely on point-to-point radio facilities and, in some areas, on open wireline facilities of marginal quality. Because of the limitations imposed by these common facilities, the types and quantities of telecommunications services available in most rural areas are restricted.

The extent of open wireline and cable, microwave radio relay, and point-to-point radio facilities in Region X is depicted in Figures 11,** 12,** and 13,** respectively.

The construction of open wireline and cable facilities in Region X for mainline use has given way in recent years to that of the more

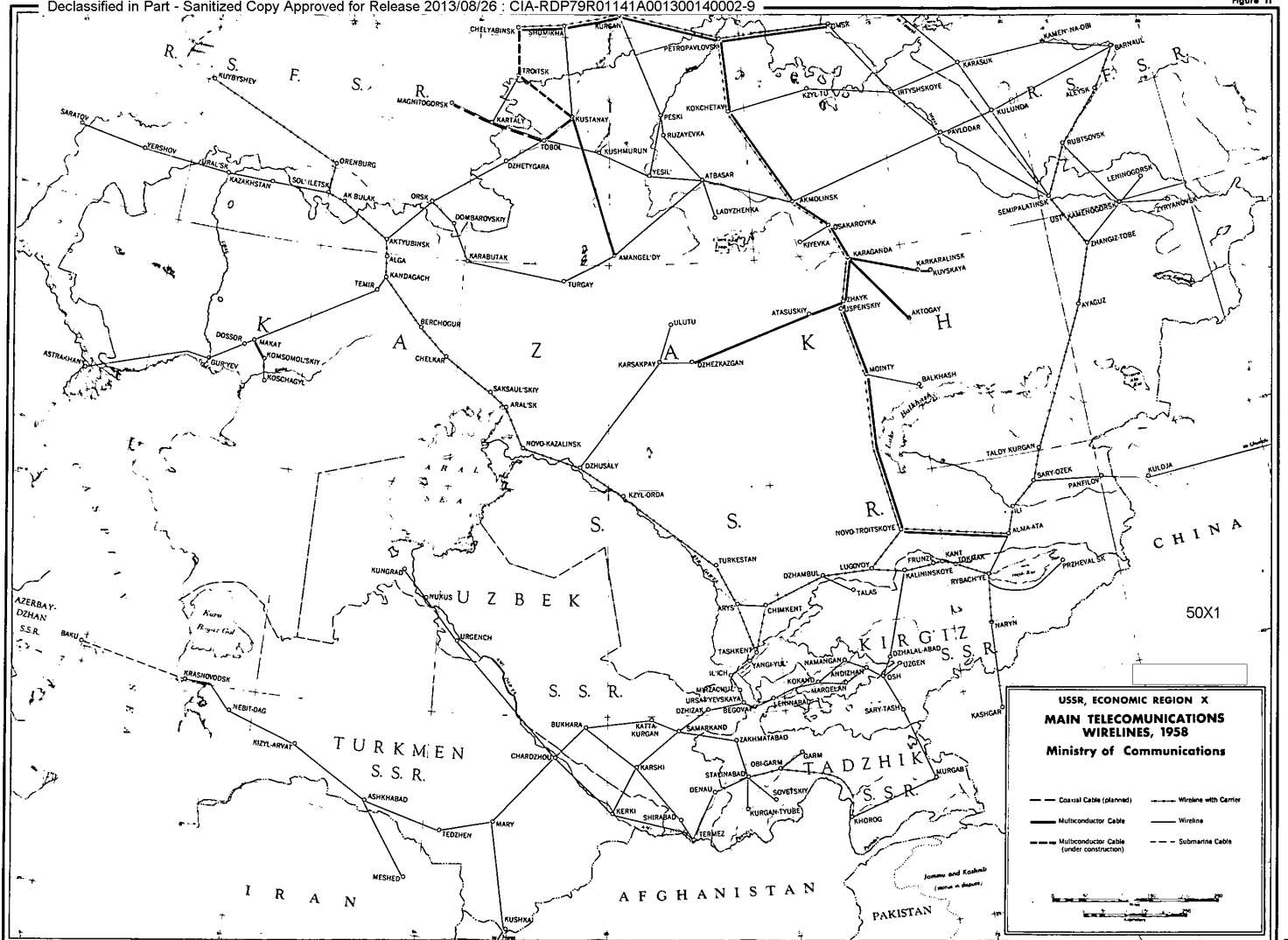
* See Figure 12, following p. 40, for the routes of microwave radio relay lines in use, planned, and under construction.

** Following p. 40.



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Figure 11



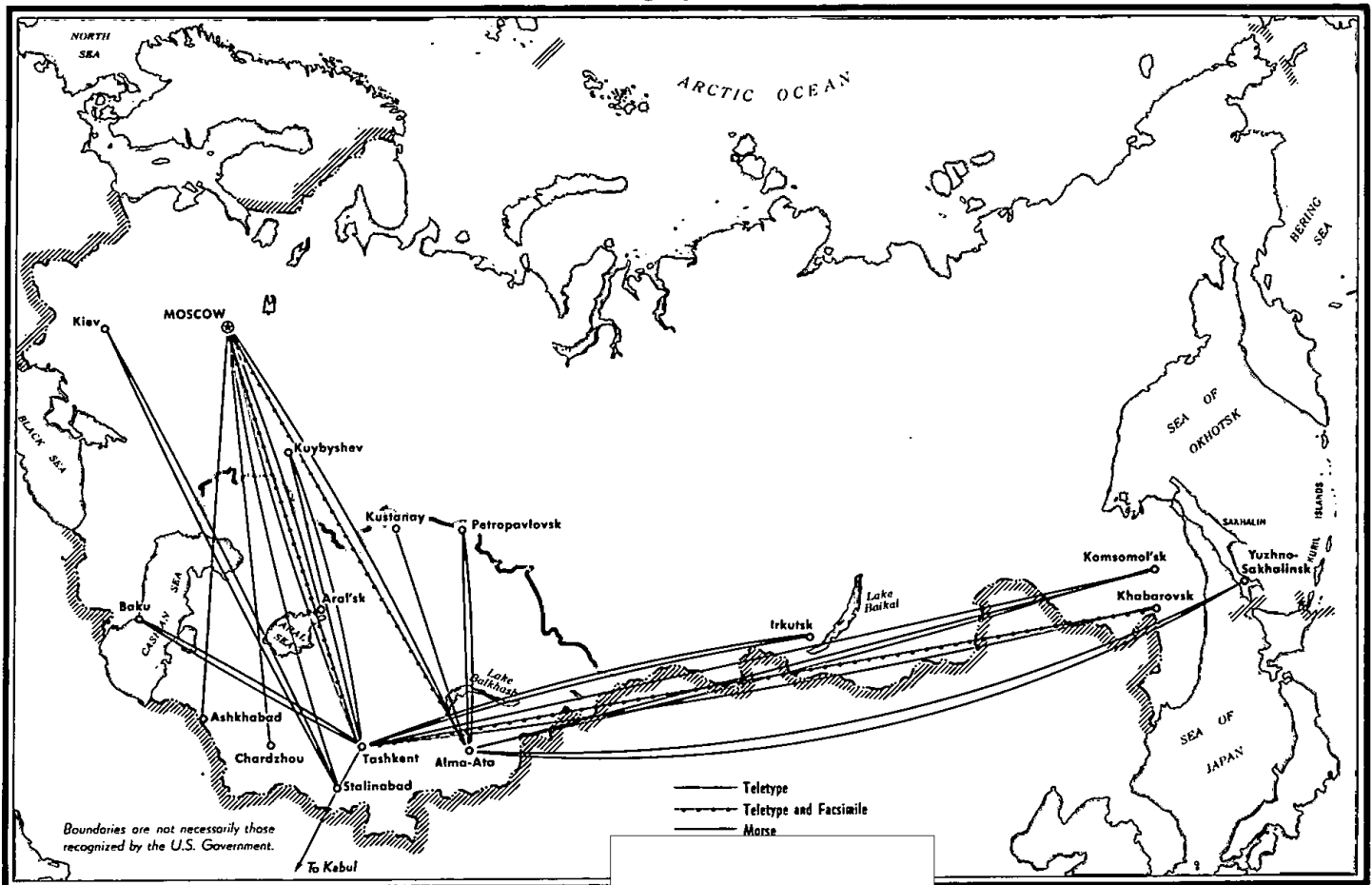
50X1



USSR, Economic Region X Main Domestic and International Radiotelegraph Circuits, 1958—Ministry of Communications

Figure 13

50X1



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modern and, in most instances, less expensive microwave radio relay facilities.* This development represents one of the most important advances in common telecommunications facilities that have taken place in Region X. 57/

The first experimental radio relay line, having a capacity of three telephone channels, was constructed in 1946 in Kirgiz SSR between Frunze and Osh. This line was put into permanent operation in 1948, and by 1957 its capacity had been expanded to 24 telephone channels. The first interrepublic microwave line in the USSR was put into operation in Region X in 1957. This line, with a capacity of 24 telephone channels, interconnected the republic capitals of Alma-Ata, Frunze, and Tashkent. In 1958 the capacity of this line was expanded to permit the transmission of television programs. 58/

At present, more than 2,000 kilometers (km) of microwave lines are in operation in Region X. These operational lines will be augmented in the near future by about 1,500 km of line presently under construction and at some future date by 5,000 km in addition. 59/

One important exception to the apparent preference for constructing microwave facilities is the multiconductor cable line that was completed in 1958 in Kazakhstan between Petropavlovsk and Alma-Ata. This cable line, connecting at Petropavlovsk with the multiconductor cable line running east from Moscow to Novosibirsk, is the first high-capacity facility to connect Region X with the rest of the USSR. 60/

In general, the common telecommunications facilities that are in operation are subject to some rather severe limitations. As a whole, common facilities have capacities that restrict their ability to meet telecommunications requirements of all consumers. In addition, the radial configuration of common facilities has restricted the ability of the republic ministries of communications to respond adequately to lateral telecommunications service requirements of sovnarkhozes, state planning committees, and marketing organizations since the economic reorganization.**

* The cost advantages gained by constructing microwave facilities are of major importance in desert and mountainous areas. Microwave facilities require less nonferrous metals, shorter construction time, and fewer operational and maintenance personnel. Substantial savings may be made, in contrast to cable and open-wireline facilities of similar capacities.

** Following the economic reorganization, the Ministry of Communications of the USSR reportedly gained control of many common telecommunications facilities that were formerly owned and operated by ministries abolished under the reorganization. There is no indication as to the extent to which this transfer of control has taken place in Region X.

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Initial steps have been taken to overcome many of the limitations that presently exist in the common facilities of Region X. The emphasis that has been placed on microwave construction in recent years, and which is apparently continuing, suggests that this type of facility will be the basis for developing mainline facilities in a pattern responsive to capacity and service requirements. Besides cost considerations, an important advantage of microwave equipment is that, after initial installation, its capacity can be easily expanded to provide additional service.

Tropospheric and ionospheric scatter facilities, currently under development in the USSR, may be introduced for mainline use in Region X in the future. At present an experimental tropospheric scatter link is in operation between Frunze and Przheval'sk in Kirgiz SSR. The use of scatter facilities would be especially applicable in Region X, as terminals can be spaced at distances ranging from about 200 to 1,500 miles. 61/

Requirements for common telecommunications facilities in secondary use will continue to be met in many areas of Region X by point-to-point radio. Plans for the development of telephone facilities in rural areas of Region X, however, suggest that a rather substantial effort will be made to extend wireline facilities to rural areas during the course of the next 7 years.

Prospects for the development of common facilities in Region X appear promising. Economic and strategic requirements for more adequate telecommunications service have forced Soviet officials at both the national and the republic levels to make provision for overcoming present inadequacies. It appears likely that most of the inadequacies of common facilities will be overcome by the end of the Seven Year Plan.

VII. Future Trends.

Soviet officials plan a rapid expansion of post and telecommunications facilities in Region X during the Seven Year Plan. They apparently recognize that the existing low level of this resource precludes its ability to serve fully the economic activity of the region. Expansion will be directed not only toward augmenting existing facilities to meet more fully established patterns of service requirements but also toward providing new facilities to meet the new pattern of lateral service requirements that has arisen as a result of the 1957 economic reorganization.

Major trends in the field of communications in Region X during 1959-65 will probably include the following:

S-E-C-R-E-T

1. Establishment of a Scientific Research Institute of Communications in Region X to work on problems associated with the development of post and telecommunications in the region.
2. Acceleration in the provision of common telecommunications facilities circuit capacity through the construction of microwave radio relay facilities for mainline service and through the construction of open wireline and low-capacity cable facilities for secondary service.
3. Widespread use of automatic and semiautomatic interurban telephone and telegraph circuits.
4. Rapid expansion of subscriber telegraph service.
5. Acceleration in the growth of interurban, urban, and rural telephone exchange capacity, with major emphasis being placed on the installation of automatic telephone exchange equipment.
6. Continued expansion of television broadcasting facilities and network television service along with rapid expansion of the television reception base.
7. Completion of the wire-diffusion network in all urban and in the more heavily populated rural areas.
8. Construction of FM radiobroadcasting and multiprogram wire-diffusion facilities in the republic capitals of Region X.
9. Expansion of radiobroadcasting transmitting and studio facilities in the outlying areas of Region X.
10. Expansion of postal routes and facilities in rural areas and increased use of mechanized postal equipment in large urban centers.
11. Integration of most functional telecommunications facilities with those of the Ministry of Communications of the USSR and of the republic ministries.
12. Increased investment responsibility by the republic ministries of communications and local organs.
13. Expansion of training facilities to achieve a higher level of technical competence of personnel of the republic ministries.

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The supply of investment funds and material and equipment probably will be sufficient to complete most of the foregoing courses of action successfully. In this event, by 1965 the republic ministries of communications will be able to supply post and telecommunications service in Region X on a level commensurate with the demands of all sectors of the economy. With this facility base in being, increased service requirements after 1965 can be met with relatively small amounts of additional investment.

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APPENDIX A

GLOSSARY OF TECHNICAL TERMS

Amplitude modulation (AM): The process by which a selected carrier frequency is varied in magnitude (amplitude) by other frequencies that contain the information to be transmitted in telecommunications. (See Frequency modulation.)

Apparatus: Instruments, machines, appliances, and other assemblies used in providing a telecommunications facility.

Automatic (as an adjective): Of or pertaining to any process involved in producing telecommunications service which does not require direct, immediate human assistance.

Band (of frequencies): The entire range of frequencies between two numerically specified frequency limits. The magnitude of this range is a limiting factor on the amount of information that can be transmitted in telecommunications. With respect to frequencies of the radio spectrum as a whole, the International Telecommunication Union has for convenience divided the whole radio spectrum into eight major bands, as follows:

Frequency Bands		
Range	Type	Corresponding Wave* Band
30 kc** and below	Very low frequencies (VLF)	Myriametric waves
30 to 300 kc	Low frequencies (LF)	Kilometric waves
300 to 3,000 kc	Medium frequencies (MF)	Hectometric waves
3,000 to 30,000 kc	High frequencies (HF)	Decametric waves
30,000 kc to 300 mc***	Very high frequencies (VHF)	Metric waves
300 to 3,000 mc	Ultra high frequencies (UHF)	Decimetric waves****
3,000 to 30,000 mc	Super high frequencies (SHF)	Centimetric waves*****
30,000 to 300,000 mc	Extremely high frequencies (EHF)	Millimetric waves*****

* Waves are undulating disturbances: a sound wave is a disturbance in the air, which is an elastic medium, and an electric wave is a disturbance in any medium whatever. The number of waves per second is the frequency of a given wave. Because the speed of wave propagation is considered to be constant, the length of a given wave is in inverse relation to its frequency: the longer the wave length, the lower the frequency, and the shorter the wave length, [Footnotes continued on p. 46]

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Cable: A bundle of sheathed, insulated wires and/or coaxial tubes, used as a telecommunications medium. It is sometimes referred to as "multiconductor cable."

Carrier (as an adjective): Of or pertaining to a technique for dividing a circuit, lane, supergroup, group, or channel into portions which can be used independently of and simultaneously with all other portions. Different frequencies or different pulses are selected for each portion to "carry" the information to be transmitted, after alteration by the information frequencies. The carrier itself need not be transmitted.

Channel: A portion, electrical or physical, of a telecommunications circuit, lane, supergroup, or group which can be used to transmit information independently of and simultaneously with all other portions. A channel may be used to provide two or more subchannels.

Circuit: A telecommunications connection between two or more distant points by a wire, cable, or radio medium facility used to carry information. The circuit is the fundamental telecommunications connection between distant points. By the application of appropriate techniques, a circuit may be arranged in many different combinations to meet the need for various kinds and quantities of telecommunications service. In its simplest form a circuit may carry only single telecommunications units in sequence. In its most complex form it may by apportionment carry simultaneously thousands of telephone channels and telegraph subchannels; a number of television programs; and other specialized kinds of service, such as high-fidelity broadcast programs, radar signals, and data-processing signals.

For the most complex application, a circuit is often arranged into lanes, each of which can carry, in 1 direction, 1 television program or 600 telephone channels. In turn, these 600 telephone channels are subdivided into 10 supergroups of 60 telephone channels each. Each supergroup is subdivided into 5 groups of 12 telephone channels each. One or more telephone channels may be further subdivided into three to twenty 60-word-per-minute teletype subchannels. Other specialized kinds of service may be accommodated by combining two or more telephone channels.

the higher the frequency. Wave length is usually measured in linear units of the metric system.

** Kilocycles per second, or 1,000 cycles per second.

*** Megacycles per second, or 1 million cycles per second.

**** It is becoming common usage to refer to waves (frequencies) in these three bands as "microwaves."

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Coaxial (as an adjective): Of or pertaining to a modern telecommunications cable medium technique using one or more tubes (sometimes called "pipes"). Each metal tube surrounds a conducting wire supported concentrically by insulators. The space in the tube usually contains nitrogen gas under pressure. Generally, coaxial cable is used for the transmission of information in complex form, such as radar, computer data, or television signals, and/or for the transmission of telephone channels and telegraph subchannels. A single tube usually carries information in only one direction at a time. The capacity of a tube depends in part upon the distance between repeater stations. In the standard facility, which may have from 2 to 8 tubes in the cable, a single tube carries a lane of 600 telephone channels or 1 television lane, for which the repeater station spacing is about 7 statute miles. In a new developmental coaxial cable facility, a single tube may carry 3 lanes of a total of 1,800 telephone channels or 3 television lanes, for which the repeater station spacing is expected to be about 3 statute miles.

Electronics: A general term used to identify that branch of electrical science and technology that treats of the behavior of electrons in vacuums, gases, or solids. Today, telecommunications makes extensive use of electronic technology.

Facility: An association of apparatus, material, and electrical energy required to furnish telecommunications service.

Facsimile (as an adjective): Of or pertaining to a telecommunications (telegraph) service in which photographs, drawings, handwriting, and printed matter are transmitted for graphically recorded reception. In one method (Type A), images are built up of lines or dots of constant intensity. In another method (Type B), images are built up of lines or dots of varying intensity, sometimes referred to as "telephoto" and "photoradio."

Feeder (as an adjective): Of or pertaining to telecommunications facilities of relatively low capacity which join facilities of relatively high capacity. (See Main.)

Frequency: The rate in cycles per second at which an electric current, voltage, wave, or field alternates in amplitude and/or direction. (See Band.)

Frequency modulation (FM): The process by which a selected carrier frequency is varied in frequency by other frequencies that contain the information to be transmitted in telecommunications. (See Amplitude modulation.)

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Functional (as an adjective): Of, pertaining to, or connected with special, unique, or particular telecommunications facilities managed and operated by a single agency, organization, company, department, committee, ministry, or other entity, in contrast to the facilities of a basic system.

Group: A number of channels (usually 12) or subchannels combined (multiplexed) electrically in building up the total capacity of a telecommunications circuit, lane, or supergroup.

Ionosphere: Those layers of the earth's atmosphere occupying the space about 210 statute miles in thickness extending from about 30 statute miles above the earth's surface to the outer reaches (exosphere) of the atmosphere. Reflection from these layers makes possible long-distance transmission of radio signals. The layers, however, are responsible for fading of signals, skip distance, and differences between daytime and nighttime radio reception. They are also used as a scattering reflector for ionosphere scatter-transmission techniques to transmit to distances of about 1,000 to 1,500 statute miles.

Joint facility: A telecommunications facility owned, controlled, or operated by two or more agencies, organizations, companies, departments, committees, ministries, or other entities.

Lane: A 1-way portion, electrical or physical, of a 2-way telecommunications circuit which can be used independently of and simultaneously with all other portions. The largest lane today can handle 600 telephone channels or 1 television program. In some applications the direction of a lane may be reversed.

Leased (as an adjective): Of or pertaining to the direct operation by a user of a telecommunications facility owned by another agency.

Line: A general term used to delineate a telecommunications circuit facility (wire, cable, or radio).

Main (as an adjective): Of or pertaining to telecommunications facilities at and between principal cities and centers which have relatively high capacity compared with feeder facilities. (See Feeder.)

Medium: Any substance or space that can be used practically to transmit a form of electrical energy for the purpose of providing telecommunications service.

Microwave radio relay (as an adjective): Of or pertaining to a radio medium technique in modern telecommunications employing radio

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frequencies higher than 300 mc. These frequencies do not normally afford practical direct transmission to great distances, principally because they do not bend well around the earth's surface and because they do not reflect well from the ionosphere. They are, however, capable of reliable transmission from horizon to horizon (line-of-sight) by the use of special antennas which concentrate the radio energy and give it desired direction. Great distances can, in consequence, be reached by this technique by the interposition of relay stations along the route of the line with a spacing interval of from 25 to 40 statute miles, depending upon terrain conditions. This technique can be employed practically to carry from a small number of telephone channels and telegraph subchannels to thousands of such channels and subchannels through 2 or more lanes and to carry 1 or more television and other specialized lanes and channels. (See Band.)

Mobile (as an adjective): Of or pertaining to a telecommunications facility which is intended to be operational while in motion or during halts at unspecified points. (See Portable.)

Modulation: The process of altering a carrier frequency or carrier pulses by other frequencies or pulses representing the information being transmitted.

Multiplex (as an adjective): Of or pertaining to the combining of information signals, modulated or unmodulated, of two or more lanes, supergroups, groups, channels, or subchannels for transmission over the same circuit.

Network: An interconnection, electrical or physical, of two or more circuits or portions thereof for the purpose of facilitating telecommunications service.

Point-to-point (as an adjective): Generally, of or pertaining to telecommunications service between fixed points, using the radio medium.

Portable (as an adjective): Of or pertaining to a telecommunications facility which can be readily moved from place to place but is not normally operational while in motion. (See Mobile.)

Private (as an adjective): Belonging to or concerning an individual person, organization, institution, or activity; not public or common.

Pulse: A spurt of electrical energy of extremely short duration (usually measured in millionths of a second), yet capable of being used in telecommunications to transmit information.

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Quad: In a multiconductor telecommunications cable, the physical association of a group of 4 conductors in any one of various arrangements for the purpose of providing 2-way multichannel operation.

Reception base: The aggregate telecommunications receiving facilities employed in providing a broadcast service.

Route: The geographical path followed by a wire, cable, or radio line.

Scatter (as an adjective): Of or pertaining to a radio medium technique in modern telecommunications by which energy in radio frequencies above 30 mc is deliberately scattered into one or the other of two reflecting portions of the atmosphere (troposphere and ionosphere) at a predetermined angle such that a usable portion of the energy arrives at the desired receiving location. This technique is especially applicable to regions in high latitudes (Arctic and Antarctic) where facilities of other media suffer from the rigors of weather and terrain and where the conventional long-distance radio media of the lower frequency bands (200 kc to 30 mc) are subject to serious disruptive propagational anomalies. (See Band.)

Subchannel: A portion, electrical or physical, of a telecommunications channel which can be used independently of and simultaneously with all other portions. An appreciable number of telephone channels can usually be subchanneled to carry from three to twenty 60-word-per-minute teletype subchannels on each telephone channel so employed.

Subscriber: Any customer who directly operates telecommunications apparatus in obtaining telecommunications service.

Supergroup: A number of groups (often five) combined (multiplexed) electrically in building up the total capacity of a telecommunications circuit or lane.

System: All of the facilities and networks managed by a single agency, organization, company, department, committee, ministry, or other entity in rendering either functional or basic telecommunications service.

Telecommunications: Transmission, reception, or exchange of information between distant points by electrical energy over a wire, cable, or radio medium facility to produce telephone, telegraph, facsimile, broadcast (aural and visual), and other similar services.

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Teletype (as an adjective): Of or pertaining to a technique for effecting telegraph service by the use of an apparatus similar to a typewriter in which information is transmitted by keyboard and received by type printer on a roll of paper or a roll of tape, or by perforations on a roll of tape, or by both. (Sometimes called a "teleprinter" or "teletypewriter.")

Transmission base: The aggregate telecommunications transmitting facilities employed in providing broadcast service.

Transistor: A modern device which is capable of performing in a solid (germanium or silicon) many of the functions performed by the conventional electronic tube in a gas or vacuum.

Troposphere: The layer of the earth's atmosphere occupying the space from the earth's surface to a height of about 6 statute miles. This layer is used as a scattering reflector for tropospheric scatter transmission techniques to distances of about 200 to 500 statute miles.

Wave guide (as an adjective): Of or pertaining to a telecommunications medium, now under development in several countries, which may be capable of transmitting extremely large amounts of conventional and complex information. It consists of a circular or rectangular hollow metallic tube in which electrical energy travels in the form of waves, much as do sound waves in a speaking tube.

Wire diffusion: Distribution of broadcast programs by a wire or cable medium to wired loudspeakers.

Wired loudspeaker: A telecommunications loudspeaker which receives from a distribution point one or more broadcast programs by a wire or cable medium.

Wireline: A general term used to identify a line consisting of either an aerial cable (and/or separate wires) or an underground cable, used as a telecommunications medium.

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APPENDIX B

METHODOLOGY

Many of the statistical data in this report were developed from information contained in statistical publications of the republics of Region X covering the years 1950 and 1955-56. Population data were used to derive per capita relationships between the USSR and Region X and between individual republics of the region. Specific methodology used in the determination of each statistical series,

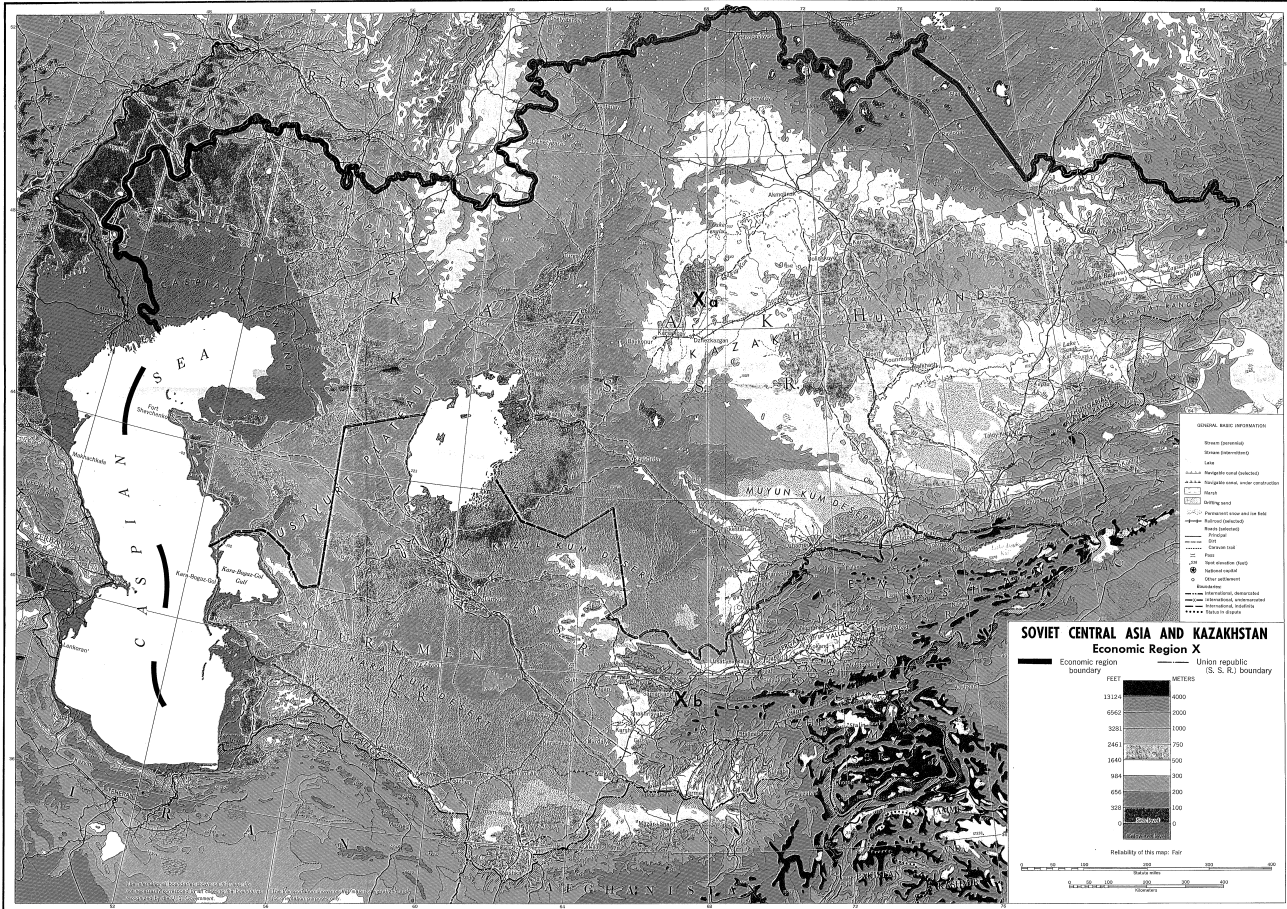
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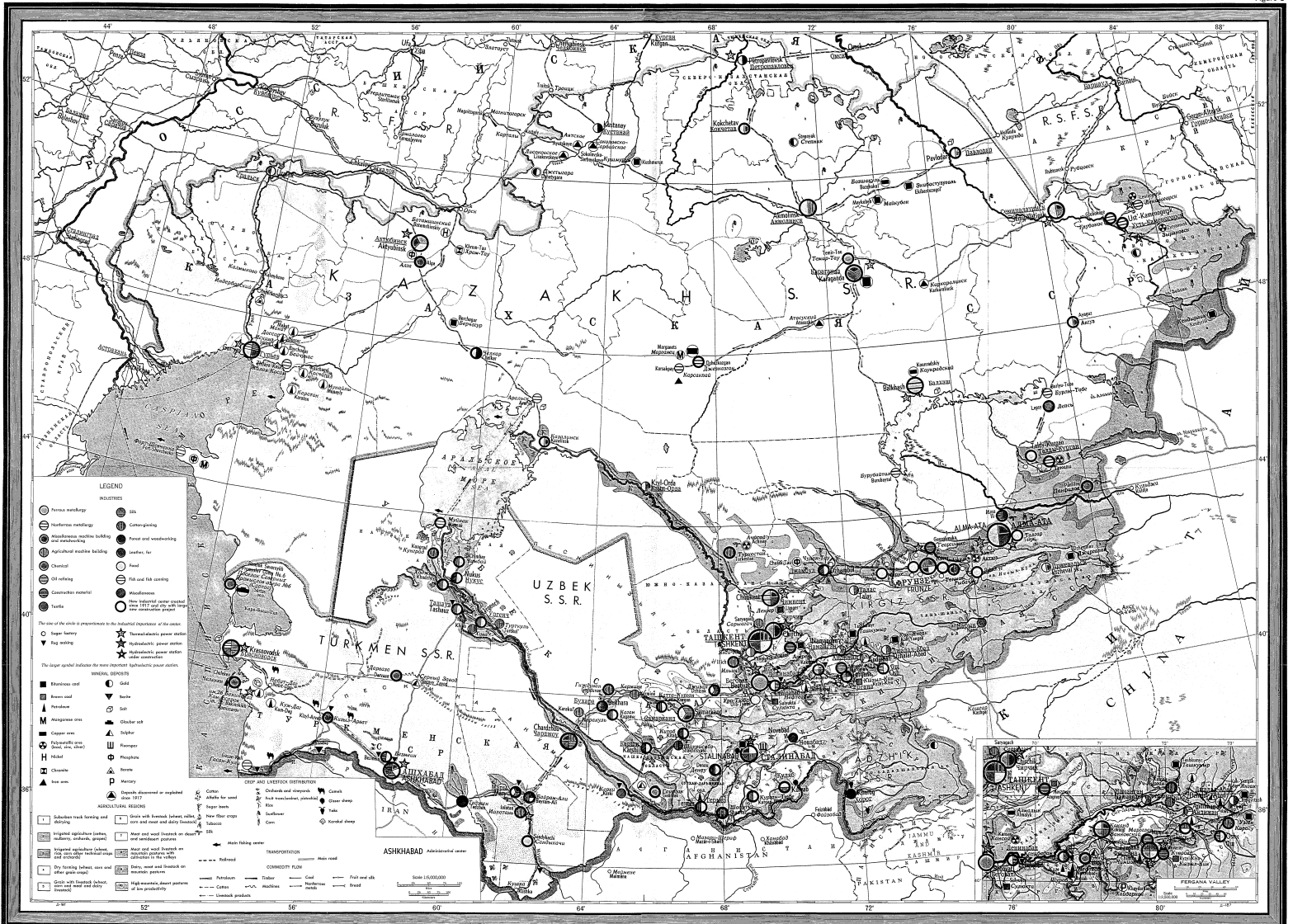
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ECONOMIC MAP OF SOVIET CENTRAL ASIA AND KAZAKHSTAN

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Figure 3



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