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Universal Multiple-Octet Coded Character Set
International Organization for Standardization

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Title: Stabilizing CJK Compatibility Ideographs through the use of Standardized Variants

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Source: The Unicode Consortium

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Background

CJK Compatibility Ideographs, for which there are now 1,002 characters as of Unicode Version 6.1, are subject to normalization, and are thus considered unstable because the distinctions that they are intended to convey cannot be preserved, regardless of which of the four normalization forms is applied. When normalized, a CJK Compatibility Ideograph is reverted into its canonical equivalent, which is always a CJK Unified Ideograph. For example, the CJK Compatibility Ideographs U+FA5D (一) and U+FA5E (二), when normalized, are reverted to their shared canonical equivalent, specifically U+8279 (一). Furthermore, given the broad extent to which text services interact in today's applications and OSes, it is not possible to guarantee that normalization will not be applied, except for completely closed environments.

In other words, a wide variety of products, protocols, and environments normalize text data on a regular basis, and this cannot be changed, so a solution for preserving the distinctions that are intended to be conveyed by CJK Compatibility Ideographs becomes necessary.

Recommendation

In order to preserve any distinctions that the 1,002 CJK Compatibility Ideographs were intended to convey, and to enable round-trip capability, it is recommended that 1,002 Standardized Variants be accepted into the standard, which would be equivalent to the CJK Compatibility Ideographs themselves, and which would be immune to the effects of normalization. Note that VS1 (U+FE00) through VS3 (U+FE02) are the VSes (*Variation Selectors*) that are used, and not the VSes in Plane 14, which are used by the IVD (*Ideographic Variation Database*).

It is also recommended that any further glyphic distinctions for these 1,002 CJK Compatibility Ideographs be handled via the IVD.

This document includes an attachment that is a complete list of the proposed Standardized Variants for all 1,002 CJK Compatibility Ideographs.

Migration Considerations For Existing Implementations

Implementations that wish to migrate from using CJK Compatibility Ideographs to these proposed 1,002 Standardized Variants need to consider both short- and long-term implications. For the short term, pre-processing filters could be used to convert CJK Compatibility Ideographs to their corresponding Standardized Variants, and for the long term, this conversion could be performed during transcoding. In order to display the appropriate glyph, affected fonts need to be updated to include the appropriate variation sequences in their Format 14 'cmap' subtable.

IME developers also need to be aware of these Standardized Variants if they intend to emit the desired results.

These migration considerations are not exhaustive, but rather they are intended to pinpoint known areas that require implementor attention.

Table of Supporting Data

The table that spans the following two pages provides details for 89 of the 1,002 CJK Compatibility Ideographs, specifically those that correspond to registered IVSes (*Ideographic Variation Sequences*).

The first two columns simply list these 89 CJK Compatibility Ideographs and their corresponding canonical equivalents. The “Adobe-Japan1” and “Hanyo-Denshi” columns indicate the registered IVSes and their sequence identifiers in the respective IVD collection. The “Standardized Variant (PROPOSED)” column, which has been shaded gray, includes a subset of the 1,002 proposed Standardized Variants. The “JIS X 0213,” “Jinmei-yō Kanji,” “IBM,” and “ARIB STD-B24” columns indicate the Japanese sources for these 89 CJK Compatibility Ideographs.

(Three pairs of cells have been shaded blue to denote CJK Compatibility Ideographs that correspond to more than one registered IVS within an IVD collection, with the darker one being the preferred IVS because it corresponds to a JIS X 0213 kanji. Two pairs of cells have been shaded yellow to denote pairs of CJK Compatibility Ideographs that simply share the same canonical equivalent.)

CJK Compatibility Ideograph	Canonical Equivalent	Adobe-Japan1		Hanyo-Denshi		Standardized Variant (PROPOSED)	JIS X 0213	Jinmei-yō Kanji	IBM	ARIB STD-B24
		IVS	Identifier	IVS	Identifier					
U+F91D	U+6B04	<6B04,E0100>	CID+13392	<6B04,E0103>	JC8627	<6B04,FE00>	1-86-27	JINMEI		
U+F928	U+5ECA	<5ECA,E0101>	CID+20303	<5ECA,E0104>	JC8414	<5ECA,FE00>	1-84-14	JINMEI		
U+F929	U+6717	<6717,E0100>	CID+20305	<6717,E0106>	JC8546	<6717,FE00>	1-85-46	JINMEI		
U+F936	U+865C	<865C,E0100>	CID+13394	<865C,E0103>	JC9147	<865C,FE00>	1-91-47	JINMEI		
U+F970	U+6BBA	<6BBA,E0100>	CID+13344	<6BBA,E0103>	JC8641	<6BBA,FE00>	1-86-41			
U+F9D0	U+985E	<985E,E0100>	CID+13396	<985E,E0103>	JC9404	<985E,FE00>	1-94-04	JINMEI		
U+F9DC	U+9686	<9686,E0101>	CID+13393	<9686,E0106>	JC9361	<9686,FE00>	1-93-61			
U+FA10	U+585A	<585A,E0101>	CID+7746	<585A,E0105>	JC1555	<585A,FE00>	1-15-55			
U+FA10	U+585A	<585A,E0102>	CID+8422	<585A,E0106>	IB1603	<585A,FE00>			IBM	
U+FA12	U+6674	<6674,E0100>	CID+8481	<6674,E0103>	IB2015	<6674,FE00>			IBM	
U+FA15	U+51DE	<51DE,E0101>	CID+20307			<51DE,FE00>	1-87-58			
U+FA15	U+51DE	<51DE,E0104>	CID+8542			<51DE,FE00>			IBM	
U+FA16	U+732A	<732A,E0100>	CID+8548	<732A,E0103>	JC8779	<732A,FE00>	1-87-79	JINMEI	IBM	
U+FA17	U+76CA	<76CA,E0101>	CID+8571	<76CA,E0103>	JTFA17	<76CA,FE00>			IBM	
U+FA18	U+793C	<793C,E0101>	CID+8579	<793C,E0103>	IB2536	<793C,FE00>			IBM	
U+FA19	U+795E	<795E,E0100>	CID+8580	<795E,E0103>	JC8928	<795E,FE00>	1-89-28	JINMEI	IBM	
U+FA1A	U+7965	<7965,E0100>	CID+8581	<7965,E0103>	JC8929	<7965,FE00>	1-89-29	JINMEI	IBM	
U+FA1B	U+798F	<798F,E0101>	CID+8583	<798F,E0103>	JC8933	<798F,FE00>	1-89-33	JINMEI	IBM	
U+FA1C	U+9756	<9756,E0101>	CID+8587	<9756,E0103>	IB3208	<9756,FE00>			IBM	
U+FA1D	U+7CBE	<7CBE,E0100>	CID+8590	<7CBE,E0103>	JTFA1D	<7CBE,FE00>			IBM	
U+FA1E	U+7FBD	<7FBD,E0100>	CID+8599	<7FBD,E0103>	IB2730	<7FBD,FE00>			IBM	
U+FA20	U+8612	<8612,E0101>	CID+8612	<8612,E0107>	JTBAAD	<8612,FE00>			IBM	
U+FA20	U+8612	<8612,E0102>	CID+21073	<8612,E0105>	JD8724	<8612,FE00>	2-87-24			
U+FA22	U+8AF8	<8AF8,E0100>	CID+8622	<8AF8,E0103>	JC9214	<8AF8,FE00>	1-92-14	JINMEI	IBM	
U+FA25	U+9038	<9038,E0102>	CID+8633	<9038,E0108>	JTFA25S	<9038,FE00>			IBM	
U+FA26	U+90FD	<90FD,E0100>	CID+8636	<90FD,E0103>	JC9274	<90FD,FE00>	1-92-74	JINMEI	IBM	
U+FA2A	U+98EF	<98EF,E0100>	CID+8699	<98EF,E0104>	JTFA2A	<98EF,FE00>			IBM	
U+FA2B	U+98FC	<98FC,E0101>	CID+8700	<98FC,E0103>	JTFA2B	<98FC,FE00>			IBM	
U+FA2C	U+9928	<9928,E0101>	CID+8702	<9928,E0103>	IB0457	<9928,FE00>			IBM	
U+FA2D	U+9DB4	<9DB4,E0100>	CID+8715	<9DB4,E0103>	IB1173	<9DB4,FE00>			IBM	
U+FA30	U+4FAE	<4FAE,E0101>	CID+13382	<4FAE,E0103>	JC1424	<4FAE,FE00>	1-14-24	JINMEI		
U+FA31	U+50E7	<50E7,E0101>	CID+13360	<50E7,E0105>	JC1441	<50E7,FE00>	1-14-41	JINMEI		
U+FA32	U+514D	<514D,E0101>	CID+13389	<514D,E0104>	JC1448	<514D,FE00>	1-14-48			
U+FA33	U+52C9	<52C9,E0100>	CID+13385	<52C9,E0103>	JC1467	<52C9,FE00>	1-14-67	JINMEI		
U+FA34	U+52E4	<52E4,E0101>	CID+13338	<52E4,E0103>	JC1472	<52E4,FE00>	1-14-72	JINMEI		
U+FA35	U+5351	<5351,E0100>	CID+13378	<5351,E0103>	JC1478	<5351,FE00>	1-14-78	JINMEI		
U+FA36	U+559D	<559D,E0101>	CID+7651	<559D,E0103>	JC1512	<559D,FE00>	1-15-12			
U+FA37	U+5606	<5606,E0100>	CID+13366	<5606,E0103>	JC1515	<5606,FE00>	1-15-15	JINMEI		
U+FA38	U+5668	<5668,E0101>	CID+13333	<5668,E0103>	JC1522	<5668,FE00>	1-15-22	JINMEI		
U+FA39	U+5840	<5840,E0101>	CID+13384	<5840,E0103>	JC1558	<5840,FE00>	1-15-58			
U+FA3A	U+58A8	<58A8,E0100>	CID+13387	<58A8,E0103>	JC1562	<58A8,FE00>	1-15-62	JINMEI		
U+FA3B	U+5C64	<5C64,E0101>	CID+13361	<5C64,E0103>	JC4765	<5C64,FE00>	1-47-65	JINMEI		
U+FA3C	U+5C6E	<5C6E,E0100>	CID+16837	<5C6E,E0103>	JC4766	<5C6E,FE00>	1-47-66			
U+FA3D	U+6094	<6094,E0100>	CID+13326	<6094,E0103>	JC8448	<6094,FE00>	1-84-48	JINMEI		
U+FA3E	U+6168	<6168,E0101>	CID+13328	<6168,E0108>	JC8460	<6168,FE00>	1-84-60			
U+FA3F	U+618E	<618E,E0100>	CID+13363	<618E,E0103>	JC8462	<618E,FE00>	1-84-62	JINMEI		

CJK Compatibility Ideograph	Canonical Equivalent	Adobe-Japan1		Hanyo-Denshi		Standardized Variant (PROPOSED)	JIS X 0213	Jinmei-yō Kanji	IBM	ARIB STD-B24
		IVS	Identifier	IVS	Identifier					
U+FA40	U+61F2	<61F2,E0103>	CID+21072	<61F2,E0105>	JC8465	<61F2,FE00>	1-84-65	JINMEI		
U+FA41	U+654F	<654F,E0100>	CID+13381	<654F,E0103>	JC8508	<654F,FE00>	1-85-08	JINMEI		
U+FA42	U+65E2	<65E2,E0100>	CID+13334	<65E2,E0104>	JC8511	<65E2,FE00>	1-85-11			
U+FA43	U+6691	<6691,E0101>	CID+13352	<6691,E0103>	JC8535	<6691,FE00>	1-85-35	JINMEI		
U+FA44	U+6885	<6885,E0100>	CID+13375	<6885,E0103>	JC8569	<6885,FE00>	1-85-69	JINMEI		
U+FA45	U+6D77	<6D77,E0100>	CID+13327	<6D77,E0103>	JC8673	<6D77,FE00>	1-86-73	JINMEI		
U+FA46	U+6E1A	<6E1A,E0100>	CID+7700	<6E1A,E0103>	JC8687	<6E1A,FE00>	1-86-87	JINMEI		
U+FA47	U+6F22	<6F22,E0101>	CID+13332	<6F22,E0103>	JC8705	<6F22,FE00>	1-87-05	JINMEI		
U+FA48	U+716E	<716E,E0100>	CID+13347	<716E,E0103>	JC8753	<716E,FE00>	1-87-53	JINMEI		
U+FA49	U+722B	<722B,E0101>	CID+15398	<722B,E0102>	JD8009	<722B,FE00>	2-80-09			
U+FA4A	U+7422	<7422,E0100>	CID+7732	<7422,E0105>	JC8805	<7422,FE00>	1-88-05	JINMEI		
U+FA4B	U+7891	<7891,E0100>	CID+13379	<7891,E0103>	JC8907	<7891,FE00>	1-89-07	JINMEI		
U+FA4C	U+793E	<793E,E0101>	CID+13348	<793E,E0103>	JC8919	<793E,FE00>	1-89-19	JINMEI		
U+FA4D	U+7949	<7949,E0101>	CID+13345	<7949,E0103>	JC8920	<7949,FE00>	1-89-20	JINMEI		
U+FA4E	U+7948	<7948,E0100>	CID+13335	<7948,E0103>	JC8923	<7948,FE00>	1-89-23	JINMEI		
U+FA4F	U+7950	<7950,E0100>	CID+13391	<7950,E0103>	JC8924	<7950,FE00>	1-89-24	JINMEI		
U+FA50	U+7956	<7956,E0101>	CID+13359	<7956,E0103>	JC8925	<7956,FE00>	1-89-25	JINMEI		
U+FA51	U+795D	<795D,E0100>	CID+13351	<795D,E0103>	JC8927	<795D,FE00>	1-89-27	JINMEI		
U+FA52	U+798D	<798D,E0100>	CID+13325	<798D,E0103>	JC8931	<798D,FE00>	1-89-31	JINMEI		
U+FA53	U+798E	<798E,E0101>	CID+13371	<798E,E0103>	JC8932	<798E,FE00>	1-89-32	JINMEI		
U+FA54	U+7A40	<7A40,E0100>	CID+13343	<7A40,E0103>	JC8945	<7A40,FE00>	1-89-45	JINMEI		
U+FA55	U+7A81	<7A81,E0101>	CID+13373	<7A81,E0103>	JC8949	<7A81,FE00>	1-89-49	JINMEI		
U+FA56	U+7BC0	<7BC0,E0101>	CID+13358	<7BC0,E0105>	JC8968	<7BC0,FE00>	1-89-68	JINMEI		
U+FA57	U+7DF4	<7DF4,E0100>	CID+13399	<7DF4,E0103>	JC9014	<7DF4,FE01>	1-90-14	JINMEI		
U+FA58	U+7E09	<7E09,E0101>	CID+18366	<7E09,E0103>	JD8448	<7E09,FE00>	2-84-48			
U+FA59	U+7E41	<7E41,E0101>	CID+13376	<7E41,E0103>	JC9019	<7E41,FE00>	1-90-19	JINMEI		
U+FA5A	U+7F72	<7F72,E0100>	CID+13353	<7F72,E0103>	JC9026	<7F72,FE00>	1-90-26	JINMEI		
U+FA5B	U+8005	<8005,E0101>	CID+13349	<8005,E0103>	JC9036	<8005,FE00>	1-90-36	JINMEI		
U+FA5C	U+81ED	<81ED,E0101>	CID+13350	<81ED,E0103>	JC9056	<81ED,FE00>	1-90-56	JINMEI		
U+FA5D	U+8279	<8279,E0101>	CID+14199	<8279,E0103>	JD8584	<8279,FE00>	2-85-84			
U+FA5E	U+8279	<8279,E0102>	CID+14198	<8279,E0104>	JD8585	<8279,FE01>	2-85-85			
U+FA5F	U+8457	<8457,E0101>	CID+13367	<8457,E0104>	JC9107	<8457,FE00>	1-91-07	JINMEI		
U+FA60	U+8910	<8910,E0101>	CID+13331	<8910,E0103>	JC9179	<8910,FE00>	1-91-79			
U+FA61	U+8996	<8996,E0101>	CID+13346	<8996,E0103>	JC9189	<8996,FE00>	1-91-89	JINMEI		
U+FA62	U+8B01	<8B01,E0100>	CID+13321	<8B01,E0103>	JC9215	<8B01,FE00>	1-92-15	JINMEI		
U+FA63	U+8B39	<8B39,E0100>	CID+13339	<8B39,E0104>	JC9216	<8B39,FE00>	1-92-16	JINMEI		
U+FA64	U+8CD3	<8CD3,E0100>	CID+13380	<8CD3,E0103>	JC9224	<8CD3,FE00>	1-92-24	JINMEI		
U+FA65	U+8D08	<8D08,E0101>	CID+13364	<8D08,E0103>	JC9229	<8D08,FE00>	1-92-29	JINMEI		
U+FA66	U+8FB6	<8FB6,E0101>	CID+15403	<8FB6,E0102>	JD8973	<8FB6,FE00>	2-89-73			
U+FA67	U+9038	<9038,E0101>	CID+13320	<9038,E0107>	JC9257	<9038,FE01>	1-92-57	JINMEI		
U+FA68	U+96E3	<96E3,E0100>	CID+13374	<96E3,E0104>	JC9367	<96E3,FE00>	1-93-67	JINMEI		
U+FA69	U+97FF	<97FF,E0101>	CID+13337	<97FF,E0108>	JC9386	<97FF,FE00>	1-93-86	JINMEI		
U+FA6A	U+983B	<983B,E0100>	CID+7788	<983B,E0103>	JC9391	<983B,FE00>	1-93-91			
U+FA6B	U+6075	<6075,E0101>	CID+13740	<6075,E0103>	JTB16C	<6075,FE00>				ARIB
U+FA6C	U+242EE	<242EE,E0101>	CID+14281	<242EE,E0103>	JTB538	<242EE,FE00>				ARIB
U+FA6D	U+8218	<8218,E0101>	CID+13695	<8218,E0103>	IB1067	<8218,FE00>				ARIB

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CJK Compatibility Ideographs & CJK Compatibility Ideographs Supplement

349E FE00; CJK COMPATIBILITY IDEOGRAPH-2F80C;
34B9 FE00; CJK COMPATIBILITY IDEOGRAPH-2F813;
34BB FE00; CJK COMPATIBILITY IDEOGRAPH-2F9CA;
34DF FE00; CJK COMPATIBILITY IDEOGRAPH-2F81F;
3515 FE00; CJK COMPATIBILITY IDEOGRAPH-2F824;
36EE FE00; CJK COMPATIBILITY IDEOGRAPH-2F867;
36FC FE00; CJK COMPATIBILITY IDEOGRAPH-2F868;
3781 FE00; CJK COMPATIBILITY IDEOGRAPH-2F876;
382F FE00; CJK COMPATIBILITY IDEOGRAPH-2F883;
3862 FE00; CJK COMPATIBILITY IDEOGRAPH-2F888;
387C FE00; CJK COMPATIBILITY IDEOGRAPH-2F88A;
38C7 FE00; CJK COMPATIBILITY IDEOGRAPH-2F896;
38E3 FE00; CJK COMPATIBILITY IDEOGRAPH-2F89B;
391C FE00; CJK COMPATIBILITY IDEOGRAPH-2F8A2;
393A FE00; CJK COMPATIBILITY IDEOGRAPH-2F8A1;
3A2E FE00; CJK COMPATIBILITY IDEOGRAPH-2F8C2;
3A6C FE00; CJK COMPATIBILITY IDEOGRAPH-2F8C7;
3AE4 FE00; CJK COMPATIBILITY IDEOGRAPH-2F8D1;
3B08 FE00; CJK COMPATIBILITY IDEOGRAPH-2F8D0;
3B19 FE00; CJK COMPATIBILITY IDEOGRAPH-2F8CE;
3B49 FE00; CJK COMPATIBILITY IDEOGRAPH-2F8DE;
3B9D FE00; CJK COMPATIBILITY IDEOGRAPH-FAD2;
3B9D FE01; CJK COMPATIBILITY IDEOGRAPH-2F8E7;
3C18 FE00; CJK COMPATIBILITY IDEOGRAPH-2F8EE;
3C4E FE00; CJK COMPATIBILITY IDEOGRAPH-2F8F2;
3D33 FE00; CJK COMPATIBILITY IDEOGRAPH-2F90A;
3D96 FE00; CJK COMPATIBILITY IDEOGRAPH-2F916;
3EAC FE00; CJK COMPATIBILITY IDEOGRAPH-2F92A;
3EB8 FE00; CJK COMPATIBILITY IDEOGRAPH-2F92C;
3EB8 FE01; CJK COMPATIBILITY IDEOGRAPH-2F92D;
3F1B FE00; CJK COMPATIBILITY IDEOGRAPH-2F933;
3FFC FE00; CJK COMPATIBILITY IDEOGRAPH-2F93E;
4008 FE00; CJK COMPATIBILITY IDEOGRAPH-2F93F;

4018 FE00; CJK COMPATIBILITY IDEOGRAPH-FAD3;
4039 FE00; CJK COMPATIBILITY IDEOGRAPH-FAD4;
4039 FE01; CJK COMPATIBILITY IDEOGRAPH-2F949;
4046 FE00; CJK COMPATIBILITY IDEOGRAPH-2F94B;
4096 FE00; CJK COMPATIBILITY IDEOGRAPH-2F94C;
40E3 FE00; CJK COMPATIBILITY IDEOGRAPH-2F951;
412F FE00; CJK COMPATIBILITY IDEOGRAPH-2F958;
4202 FE00; CJK COMPATIBILITY IDEOGRAPH-2F960;
4227 FE00; CJK COMPATIBILITY IDEOGRAPH-2F964;
42A0 FE00; CJK COMPATIBILITY IDEOGRAPH-2F967;
4301 FE00; CJK COMPATIBILITY IDEOGRAPH-2F96D;
4334 FE00; CJK COMPATIBILITY IDEOGRAPH-2F971;
4359 FE00; CJK COMPATIBILITY IDEOGRAPH-2F974;
43D5 FE00; CJK COMPATIBILITY IDEOGRAPH-2F981;
43D9 FE00; CJK COMPATIBILITY IDEOGRAPH-2F8D7;
440B FE00; CJK COMPATIBILITY IDEOGRAPH-2F984;
446B FE00; CJK COMPATIBILITY IDEOGRAPH-2F98E;
452B FE00; CJK COMPATIBILITY IDEOGRAPH-2F9A7;
455D FE00; CJK COMPATIBILITY IDEOGRAPH-2F9AE;
4561 FE00; CJK COMPATIBILITY IDEOGRAPH-2F9AF;
456B FE00; CJK COMPATIBILITY IDEOGRAPH-2F9B2;
45D7 FE00; CJK COMPATIBILITY IDEOGRAPH-2F9BF;
45F9 FE00; CJK COMPATIBILITY IDEOGRAPH-2F9C2;
4635 FE00; CJK COMPATIBILITY IDEOGRAPH-2F9C8;
46BE FE00; CJK COMPATIBILITY IDEOGRAPH-2F9CD;
46C7 FE00; CJK COMPATIBILITY IDEOGRAPH-2F9CE;
4995 FE00; CJK COMPATIBILITY IDEOGRAPH-2F9EF;
49E6 FE00; CJK COMPATIBILITY IDEOGRAPH-2F9F2;
4A6E FE00; CJK COMPATIBILITY IDEOGRAPH-2F9F8;
4A76 FE00; CJK COMPATIBILITY IDEOGRAPH-2F9F9;
4AB2 FE00; CJK COMPATIBILITY IDEOGRAPH-2F9FC;
4B33 FE00; CJK COMPATIBILITY IDEOGRAPH-2FA03;
4BCE FE00; CJK COMPATIBILITY IDEOGRAPH-2FA08;
4CCE FE00; CJK COMPATIBILITY IDEOGRAPH-2FA0D;
4CED FE00; CJK COMPATIBILITY IDEOGRAPH-2FA0E;
4CF8 FE00; CJK COMPATIBILITY IDEOGRAPH-2FA11;
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4E0D FE00; CJK COMPATIBILITY IDEOGRAPH-F967;
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934A FE00; CJK COMPATIBILITY IDEOGRAPH-F99B;
93F9 FE00; CJK COMPATIBILITY IDEOGRAPH-2F9EB;
9415 FE00; CJK COMPATIBILITY IDEOGRAPH-2F9EC;
958B FE00; CJK COMPATIBILITY IDEOGRAPH-2F9EE;
95AD FE00; CJK COMPATIBILITY IDEOGRAPH-F986;
95B7 FE00; CJK COMPATIBILITY IDEOGRAPH-2F9F0;
962E FE00; CJK COMPATIBILITY IDEOGRAPH-F9C6;
964B FE00; CJK COMPATIBILITY IDEOGRAPH-F951;
964D FE00; CJK COMPATIBILITY IDEOGRAPH-FA09;
9675 FE00; CJK COMPATIBILITY IDEOGRAPH-F959;
9678 FE00; CJK COMPATIBILITY IDEOGRAPH-F9D3;
967C FE00; CJK COMPATIBILITY IDEOGRAPH-FAC6;
9686 FE00; CJK COMPATIBILITY IDEOGRAPH-F9DC;
96A3 FE00; CJK COMPATIBILITY IDEOGRAPH-F9F1;
96B7 FE00; CJK COMPATIBILITY IDEOGRAPH-FA2F;
96B8 FE00; CJK COMPATIBILITY IDEOGRAPH-F9B8;
96C3 FE00; CJK COMPATIBILITY IDEOGRAPH-2F9F3;
96E2 FE00; CJK COMPATIBILITY IDEOGRAPH-F9EA;
96E3 FE00; CJK COMPATIBILITY IDEOGRAPH-FA68;
96E3 FE01; CJK COMPATIBILITY IDEOGRAPH-FAC7;
96F6 FE00; CJK COMPATIBILITY IDEOGRAPH-F9B2;
96F7 FE00; CJK COMPATIBILITY IDEOGRAPH-F949;
9723 FE00; CJK COMPATIBILITY IDEOGRAPH-2F9F5;
9732 FE00; CJK COMPATIBILITY IDEOGRAPH-F938;
9748 FE00; CJK COMPATIBILITY IDEOGRAPH-F9B3;
9756 FE00; CJK COMPATIBILITY IDEOGRAPH-FA1C;
9756 FE01; CJK COMPATIBILITY IDEOGRAPH-FAC8;
97DB FE00; CJK COMPATIBILITY IDEOGRAPH-FAC9;
97E0 FE00; CJK COMPATIBILITY IDEOGRAPH-2F9FA;
97FF FE00; CJK COMPATIBILITY IDEOGRAPH-FA69;
97FF FE01; CJK COMPATIBILITY IDEOGRAPH-FACA;
980B FE00; CJK COMPATIBILITY IDEOGRAPH-FACB;
980B FE01; CJK COMPATIBILITY IDEOGRAPH-2F9FE;
980B FE02; CJK COMPATIBILITY IDEOGRAPH-2F9FF;
9818 FE00; CJK COMPATIBILITY IDEOGRAPH-F9B4;
9829 FE00; CJK COMPATIBILITY IDEOGRAPH-2FA00;
983B FE00; CJK COMPATIBILITY IDEOGRAPH-FA6A;
983B FE01; CJK COMPATIBILITY IDEOGRAPH-FACC;

985E FE00; CJK COMPATIBILITY IDEOGRAPH-F9D0;
98E2 FE00; CJK COMPATIBILITY IDEOGRAPH-2FA02;
98EF FE00; CJK COMPATIBILITY IDEOGRAPH-FA2A;
98FC FE00; CJK COMPATIBILITY IDEOGRAPH-FA2B;
9928 FE00; CJK COMPATIBILITY IDEOGRAPH-FA2C;
9929 FE00; CJK COMPATIBILITY IDEOGRAPH-2FA04;
99A7 FE00; CJK COMPATIBILITY IDEOGRAPH-2FA05;
99C2 FE00; CJK COMPATIBILITY IDEOGRAPH-2FA06;
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99FE FE00; CJK COMPATIBILITY IDEOGRAPH-2FA07;
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9E7F FE00; CJK COMPATIBILITY IDEOGRAPH-F940;
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9E9F FE00; CJK COMPATIBILITY IDEOGRAPH-F9F3;
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9F0F FE00; CJK COMPATIBILITY IDEOGRAPH-2FA1A;
9F16 FE00; CJK COMPATIBILITY IDEOGRAPH-2FA1B;
9F3B FE00; CJK COMPATIBILITY IDEOGRAPH-2FA1C;
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9F8D FE00; CJK COMPATIBILITY IDEOGRAPH-F9C4;
9F8E FE00; CJK COMPATIBILITY IDEOGRAPH-FAD9;
9F9C FE00; CJK COMPATIBILITY IDEOGRAPH-F907;
9F9C FE01; CJK COMPATIBILITY IDEOGRAPH-F908;
9F9C FE02; CJK COMPATIBILITY IDEOGRAPH-FACE;
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20525 FE00; CJK COMPATIBILITY IDEOGRAPH-2F91B;
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20804 FE00; CJK COMPATIBILITY IDEOGRAPH-2F9D9;
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20B63 FE00; CJK COMPATIBILITY IDEOGRAPH-2F838;
214E4 FE00; CJK COMPATIBILITY IDEOGRAPH-2F859;
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21B18 FE00; CJK COMPATIBILITY IDEOGRAPH-2F871;
21D0B FE00; CJK COMPATIBILITY IDEOGRAPH-2F8F8;
21DE4 FE00; CJK COMPATIBILITY IDEOGRAPH-2F87B;
21DE6 FE00; CJK COMPATIBILITY IDEOGRAPH-2F87D;
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2219F FE00; CJK COMPATIBILITY IDEOGRAPH-2F939;
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22331 FE01; CJK COMPATIBILITY IDEOGRAPH-2F892;
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2284A FE00; CJK COMPATIBILITY IDEOGRAPH-FACF;
22B0C FE00; CJK COMPATIBILITY IDEOGRAPH-2F8B8;
22BF1 FE00; CJK COMPATIBILITY IDEOGRAPH-2F8BE;
2300A FE00; CJK COMPATIBILITY IDEOGRAPH-2F8CA;
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2335F FE00; CJK COMPATIBILITY IDEOGRAPH-2F980;
23393 FE00; CJK COMPATIBILITY IDEOGRAPH-2F989;
2339C FE00; CJK COMPATIBILITY IDEOGRAPH-2F98A;
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233D5 FE00; CJK COMPATIBILITY IDEOGRAPH-FAD1;
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238A7 FE00; CJK COMPATIBILITY IDEOGRAPH-2F8F0;
23A8D FE00; CJK COMPATIBILITY IDEOGRAPH-2F8F7;
23AFA FE00; CJK COMPATIBILITY IDEOGRAPH-2F8F9;
23CBC FE00; CJK COMPATIBILITY IDEOGRAPH-2F8FB;
23D1E FE00; CJK COMPATIBILITY IDEOGRAPH-2F906;

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25133 FE00; CJK COMPATIBILITY IDEOGRAPH-2F944;
25249 FE00; CJK COMPATIBILITY IDEOGRAPH-FAD5;
2541D FE00; CJK COMPATIBILITY IDEOGRAPH-2F94D;
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2569A FE00; CJK COMPATIBILITY IDEOGRAPH-2F954;
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2597C FE00; CJK COMPATIBILITY IDEOGRAPH-2F95C;
25AA7 FE00; CJK COMPATIBILITY IDEOGRAPH-2F95D;
25AA7 FE01; CJK COMPATIBILITY IDEOGRAPH-2F95E;
25BAB FE00; CJK COMPATIBILITY IDEOGRAPH-2F961;
25C80 FE00; CJK COMPATIBILITY IDEOGRAPH-2F965;
25CD0 FE00; CJK COMPATIBILITY IDEOGRAPH-FAD6;
25F86 FE00; CJK COMPATIBILITY IDEOGRAPH-2F96B;
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26228 FE00; CJK COMPATIBILITY IDEOGRAPH-2F972;
26247 FE00; CJK COMPATIBILITY IDEOGRAPH-2F973;
262D9 FE00; CJK COMPATIBILITY IDEOGRAPH-2F975;
2633E FE00; CJK COMPATIBILITY IDEOGRAPH-2F977;
264DA FE00; CJK COMPATIBILITY IDEOGRAPH-2F97B;
26523 FE00; CJK COMPATIBILITY IDEOGRAPH-2F97C;
265A8 FE00; CJK COMPATIBILITY IDEOGRAPH-2F97E;
267A7 FE00; CJK COMPATIBILITY IDEOGRAPH-2F987;

267B5 FE00; CJK COMPATIBILITY IDEOGRAPH-2F988;
26B3C FE00; CJK COMPATIBILITY IDEOGRAPH-2F997;
26C36 FE00; CJK COMPATIBILITY IDEOGRAPH-2F9A4;
26CD5 FE00; CJK COMPATIBILITY IDEOGRAPH-2F9A6;
26D6B FE00; CJK COMPATIBILITY IDEOGRAPH-2F9A5;
26F2C FE00; CJK COMPATIBILITY IDEOGRAPH-2F9AD;
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273CA FE00; CJK COMPATIBILITY IDEOGRAPH-2F9AB;
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278AE FE00; CJK COMPATIBILITY IDEOGRAPH-2F9CB;
27966 FE00; CJK COMPATIBILITY IDEOGRAPH-2F9CC;
27CA8 FE00; CJK COMPATIBILITY IDEOGRAPH-2F9D3;
27ED3 FE00; CJK COMPATIBILITY IDEOGRAPH-FAD7;
27F2F FE00; CJK COMPATIBILITY IDEOGRAPH-2F9D8;
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28BFA FE00; CJK COMPATIBILITY IDEOGRAPH-2F9ED;
28D77 FE00; CJK COMPATIBILITY IDEOGRAPH-2F9F1;
29145 FE00; CJK COMPATIBILITY IDEOGRAPH-2F9F6;
291DF FE00; CJK COMPATIBILITY IDEOGRAPH-2F81C;
2921A FE00; CJK COMPATIBILITY IDEOGRAPH-2F9F7;
2940A FE00; CJK COMPATIBILITY IDEOGRAPH-2F9FB;
29496 FE00; CJK COMPATIBILITY IDEOGRAPH-2F9FD;
295B6 FE00; CJK COMPATIBILITY IDEOGRAPH-2FA01;
29B30 FE00; CJK COMPATIBILITY IDEOGRAPH-2FA09;
2A0CE FE00; CJK COMPATIBILITY IDEOGRAPH-2FA10;
2A105 FE00; CJK COMPATIBILITY IDEOGRAPH-2FA12;
2A20E FE00; CJK COMPATIBILITY IDEOGRAPH-2FA13;
2A291 FE00; CJK COMPATIBILITY IDEOGRAPH-2FA14;
2A392 FE00; CJK COMPATIBILITY IDEOGRAPH-2F88F;
2A600 FE00; CJK COMPATIBILITY IDEOGRAPH-2FA1D;

Subject: Preserving round-trip integrity of CJK compatibility ideographs

Date: 2012-2-16

Source: Masahiro Sekiguchi (An expert's individual contribution)

Re: WG 2 N4246 (Stabilizing CJK Compatibility Ideographs through the use of Standardized Variants)

Summary

The author partly understands the concerns expressed in N4246 but does not think the recommendation in N4246 is a good solution. Alternatives and some analysis are given for further discussion.

Introduction

In early days of UCS/Unicode, CJK COMPATIBILITY IDEOGRAPHS are introduced into the standard to assure so-called "round-trip integrity" upon transcoding between the UCS/Unicode and some other coded character sets. Many of those added later have similar purposes, too.

Round-trip integrity is an important feature for some particular application, but not so important for some others. Use of compatibility ideographs is not recommended in an application that has no such requirements, so the presence of compatibility ideographs in their data, or any convention/profile that explicitly allows/requires use of them, is a clear indication that the application requires the round-trip integrity. (Note that in this context, *application* means not just an application program but a collection of multiple programs possibly connected through network, collaboratively performing a specific objective.)

I don't know why designers of Unicode Normalization Specification decided to fold compatibility ideographs into unified ideographs upon normalization, but the straight forward consequence of the decision is that an application that requires round-trip integrity upon transcoding should not normalize Unicode data anywhere inside the application.

The author of N4246 just writes "*it is not possible to guarantee that normalization will not be applied, except for completely closed environments.*" It may be true,

but we today have a lot of programs that, say, blindly consider the data is pure ASCII, Shift-JIS, or something else, breaking Unicode data. It is not possible to guarantee that bad handling of data based on wrong encoding assumptions will not be applied, except for completely closed environments. Both of them are sad facts. I'm not sure why the author of N4246 emphasizes the former.

I consider it is primarily a mistake of end users, system integrators, or application program designers doing normalization in an application where compatibility ideographs are required.

At the same time, I know that, in many contexts, especially those related to modern Internet, many aspects of the normalization benefits, e.g., recognizing a composite sequence and a precomposed character of a *same* accented letter, are getting more and more important. There are applications that round-trip integrity is essential, and many normalization aspects are also important.

I agree the use community of UCS/Unicode requires some solution.

My objection to the recommendation in N4246

N4246 says "1,002 Standardized Variants ... would be equivalent to the CJK Compatibility Ideographs". It is not clear what the word *equivalent* means in this context. I want clarification how those Standardized Variants are meant to be used.

If the word "equivalent" means "to be normalized", the recommendation can't be a solution to the normalization problem, so I think it means something else.

I have a feeling it means "should be used in place of". If I'm correct, it requires a large amount of updates to the existing applications that depends on compatibility ideographs today, and I don't think the transition is feasible. I don't understand why use think "a wide variety of products, protocols, and environments normalize text data on a regular basis, and this cannot be changed" while use think transition from use of compatibility ideographs to the newly proposed sequences is easy.

Alternative 1

The first alternative proposed here is to define several other types of normalization forms that preserve compatibility ideographs as they are while normalizing composite sequences and precomposed characters. We need further study before deciding which parts of the mappings should be kept and which parts should be changed in details, but I believe it's doable.

The best part of this alternative is that most of the transcoding-dependent applications require very small changes; when the new normalization forms are supported on the platforms, application programs simply invoke the normalization services to use the newly-defined normalization. It is a big difference from the N4246 recommendation; it requires rewriting of all existing application that use compatibility ideographs to use the newly introduced *standardized variant sequences*.

Alternative 2

Recommend everyone to keep all Unicode data in their original no-normalized forms, and perform normalization only before comparison or similar operation, discarding the normalized data soon.

I understand this changes today's practice. I also remember the discussion took place in a W3C working group that published a "normalize everything before send it to the Net" recommendation. However, there are good chances this change is accepted by the community, because security environment surrounding the Internet application changed in the past decade, and application that communicate through Internet anyway need to normalize all received data before any normalization-critical operations since it can't assume the received data from someone else is properly normalized.

The transition need not be immediate nor synchronized. Yes, it will require some long time to this transition to complete all over the world, but anybody who concerns problem can start early without waiting others. This seems a big plus of this alternative.

What is the problem, by the way?

The document N4246 is busy to explain what happens when normalization is applied to compatibility ideographs and *solution*, it is silent on what is the problem. As an engineer working for an IT vendor, I receive many tough issues regarding Unicode or other codeset issues though the company's sales and support division in regular basis, but I have never heard of complains something like "My compatibility ideograph was lost after normalization!" I doubt you are only discussing possibilities of problems but real problems.

On the other hand, I sometimes receive query on composite sequence and precomposed character comparison issues recently, especially those regarding voiced kana letters. I sometimes recommend normalize-before-compare strategy, but, of course, I can't always because it breaks round-trip integrity if the application requires one. My problem is hence: how I can process compatibility ideographs maintaining round-trip integrity, while recognizing a corresponding composite sequence and a precomposed character identical. I have no easy and universal solution to the problem.

I love to work with those who share the same concern for a good solution (not limited to two proposals stated in this document,) although it is not appropriate to say it here, since it seems a separate goal from N4246.