

B5Gモバイル環境

(3) モバイル基地局開発環境

基礎データ

無線エリアについて

1. 無線局一覧

- ①Sub6自営網基地局システムの屋外局
- ②Sub6自営網基地局システムの屋内局（移動局）
- ③Sub6自営網基地局システムの試験端末局1～4
- ④Sub6公衆網模擬基地局システムの屋内局（移動局）
- ⑤ミリ波帯自営網基地局システムの屋外局
- ⑥ミリ波帯自営網基地局システムの屋内局（移動局）
- ⑦ミリ波帯自営網基地局システムのLTE局
- ⑧評価用5G端末局1～2

モバイル基地局開発環境 システム構成

Sub6（自営網・公衆網模擬）

- 凡例
- 光
 - Ether
 - 同軸

既設 GPS

屋外 RU

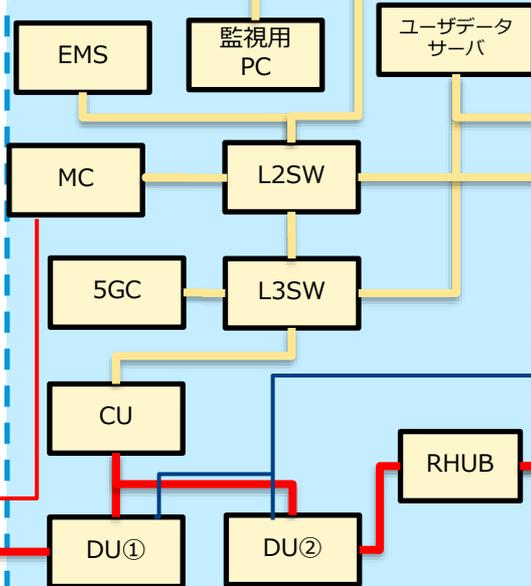
屋上既設ポール

屋上既設ポール

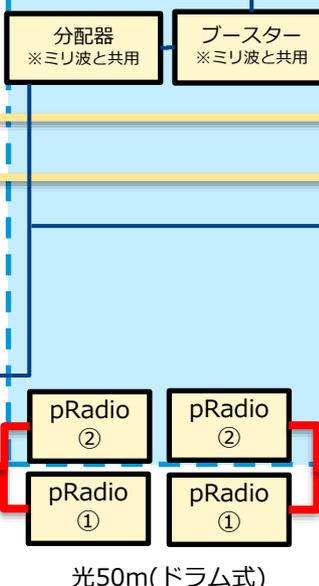
1番館

JGNX

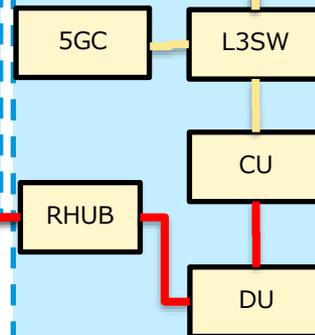
既設ラック①（自営）



既設ラック③



既設ラック②（疑似公衆）



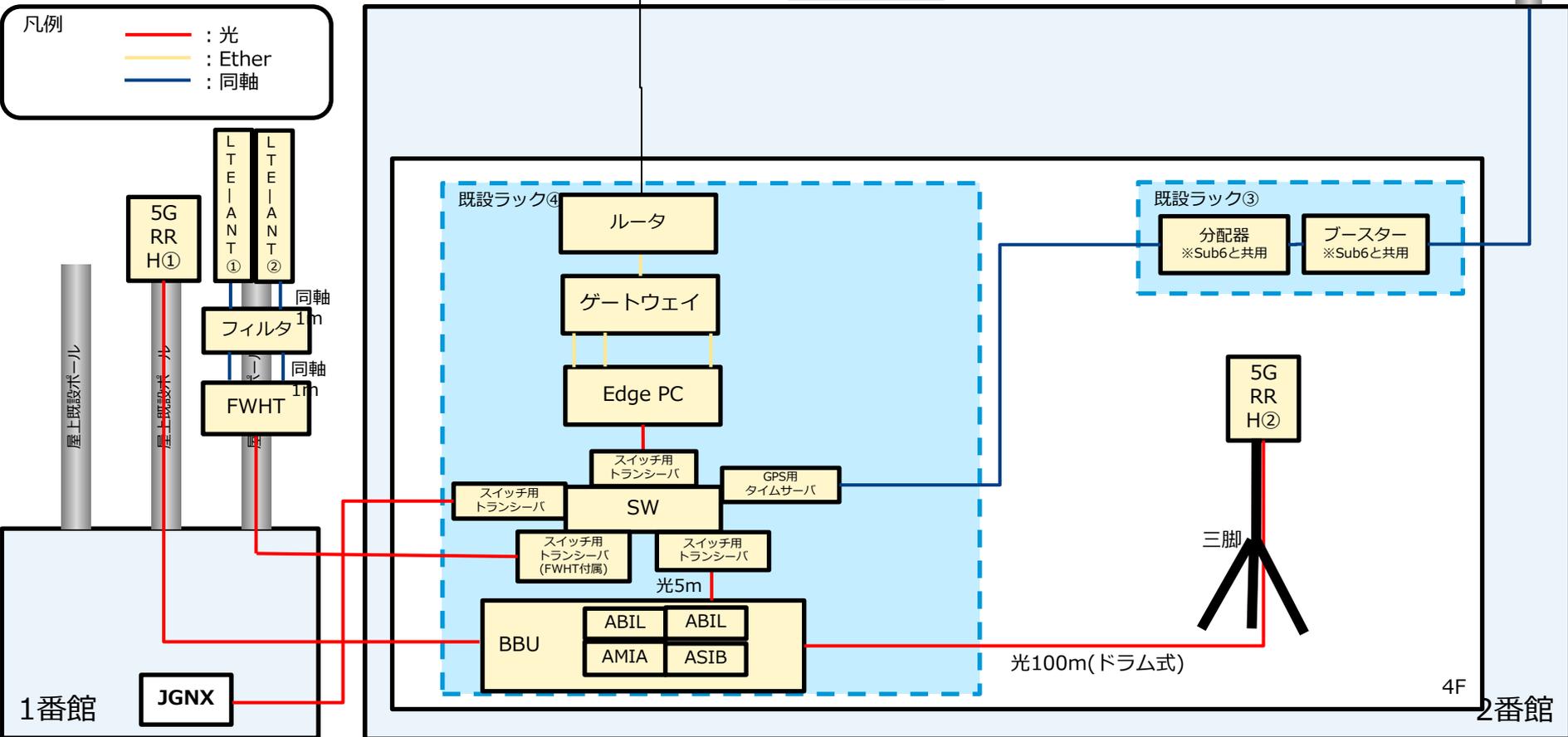
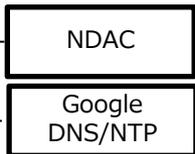
4F

2番館

モバイル基地局開発環境 システム構成

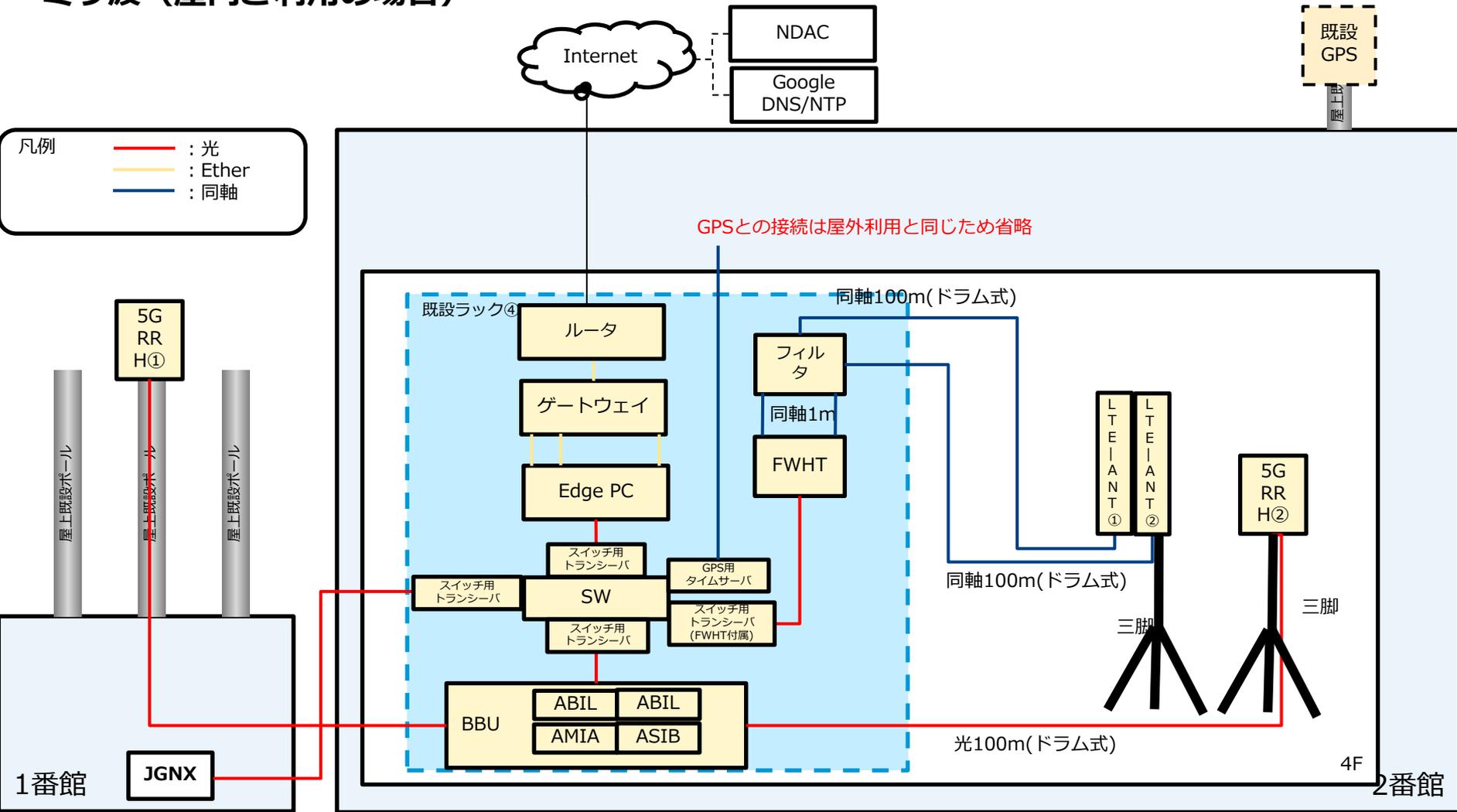
ミリ波

- 凡例
- : 光
 - : Ether
 - : 同軸



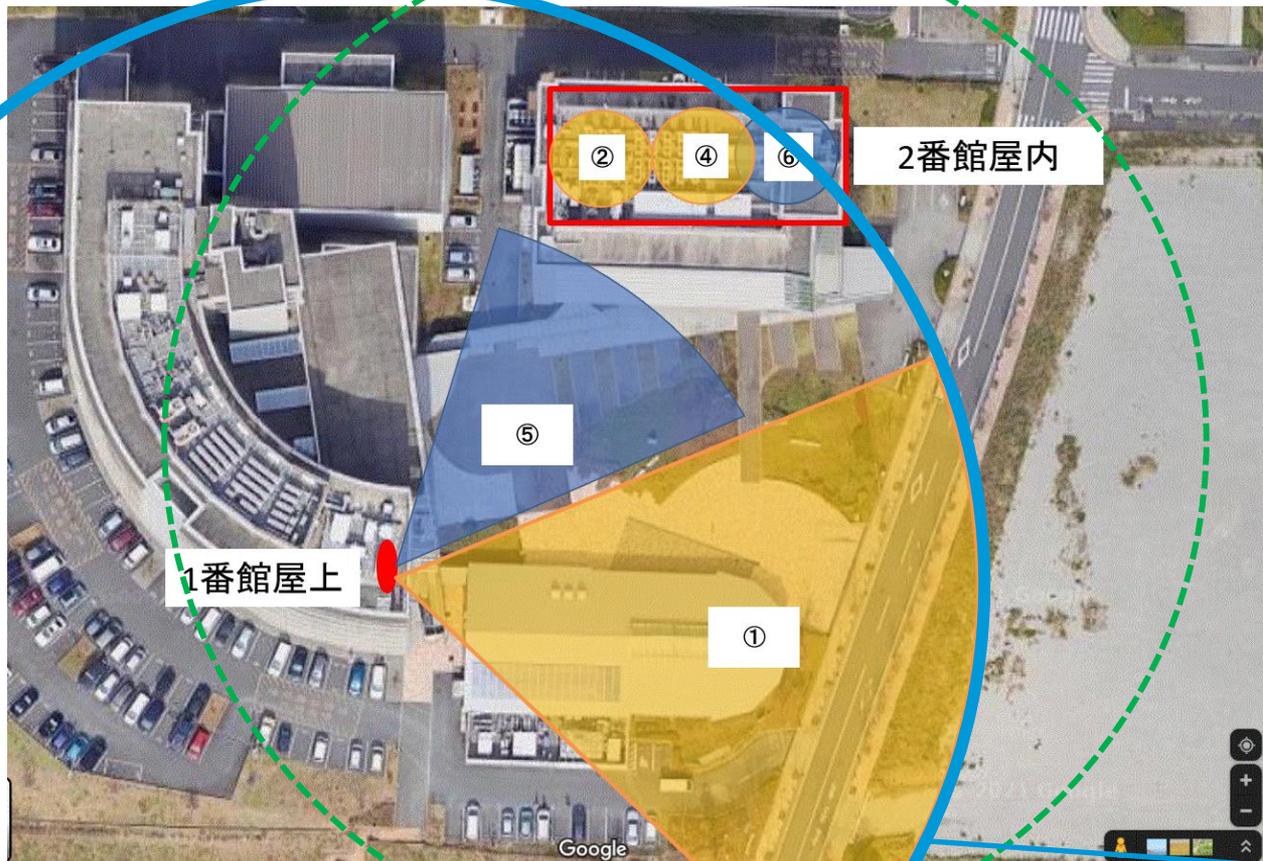
モバイル基地局開発環境 システム構成

ミリ波（屋内ご利用の場合）



無線局の設置及び無線エリア イメージ

場所：神奈川県横須賀市光の丘3-4 YRPセンター1番館および2番館



2番館4階にてアンテナを移動させ
実験用の無線エリアを構築

- ②Sub6自営網 屋内局（移動局）
- ④Sub6公衆網模擬 屋内局（移動局）
- ⑥ミリ波帯自営網 屋内局（移動局）

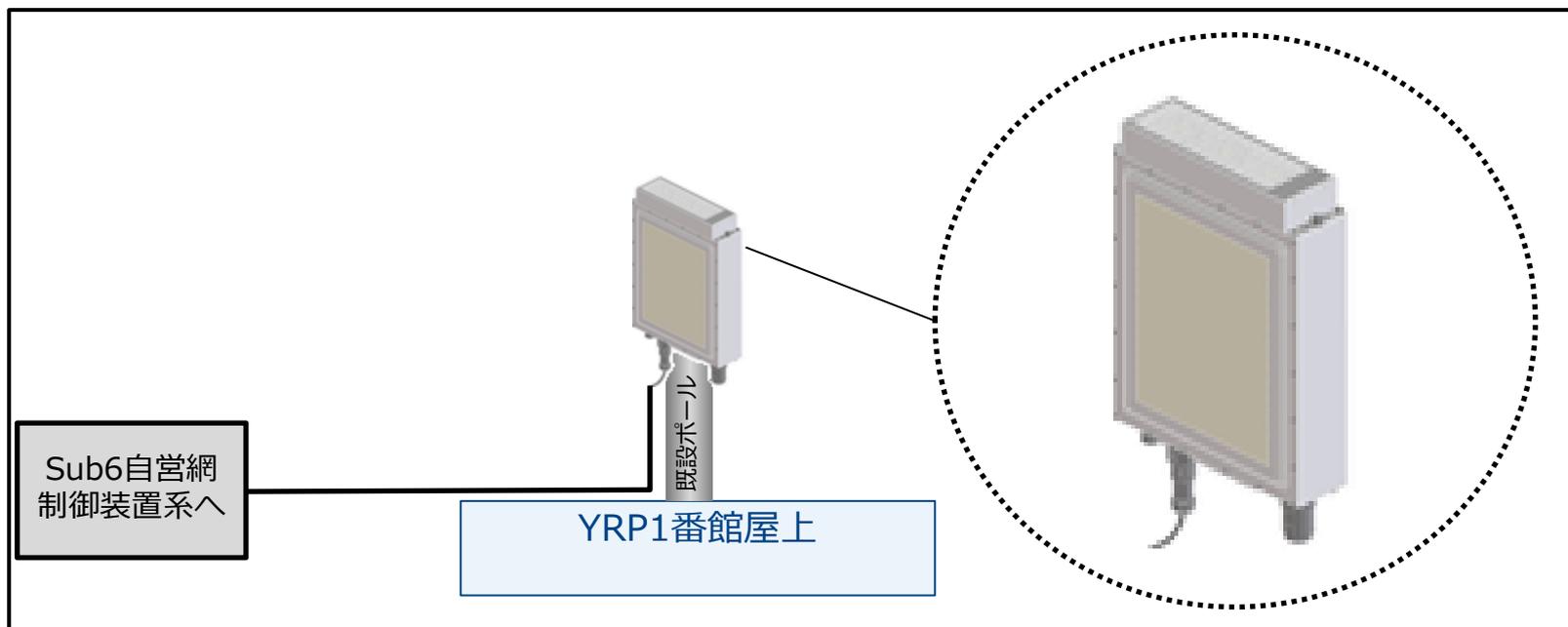
1番館屋上既設ポールにアンテナ
を常設して無線エリアを構築

- ①Sub6自営網 屋外局
- ⑤ミリ波帯自営網 屋外局
- ⑦ミリ波帯自営網 LTE局

- ③Sub6自営網試験端末局
- ⑧評価用5G端末局

無線局の構成

① Sub6自営網基地局システムの屋外局（常設局）



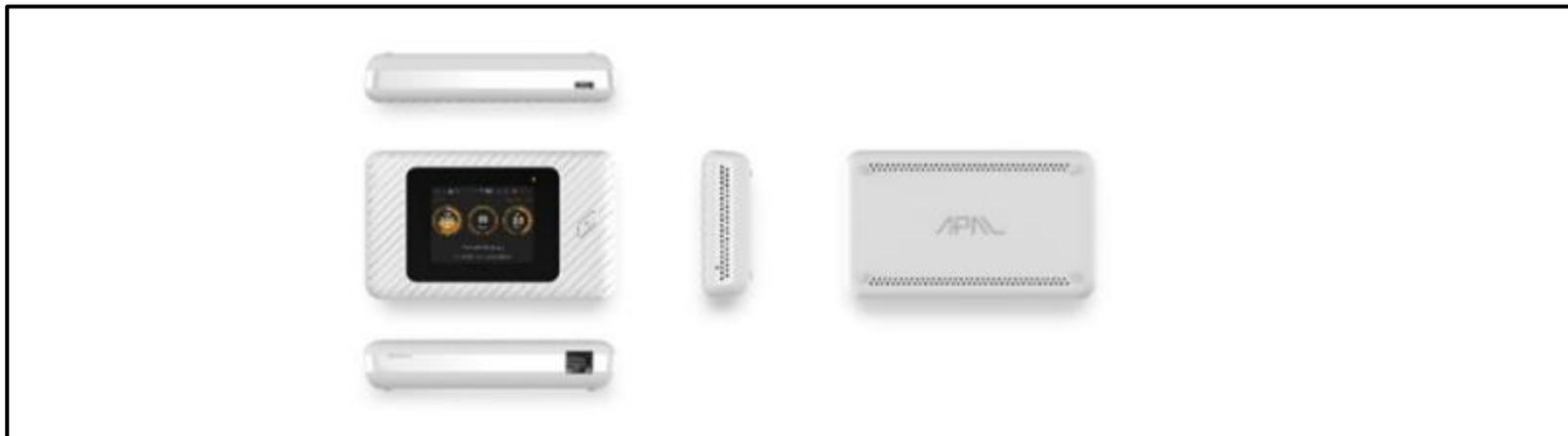
項目	内容
型式又は名称（ベンダ名）	PW3 2 0 - DU PW3 3 1 - 4 8 L 4 A - SRU（富士通）
周波数	4.84998GHz
電波の型式	99M9 X7W
空中線電力	0.309W
アンテナ利得	14.3dBi

② Sub6自営網基地局システムの屋内局（移動局）



項目	内容
型式又は名称（ベンダ名）	PW-320-DU PW332-pRadio（九州テン）
周波数	4.84998GHz
電波の型式	99M9 X7W
空中線電力	0.01W
アンテナ利得	2.5dBi

③ Sub6自営網基地局システムの試験用端末局1～4



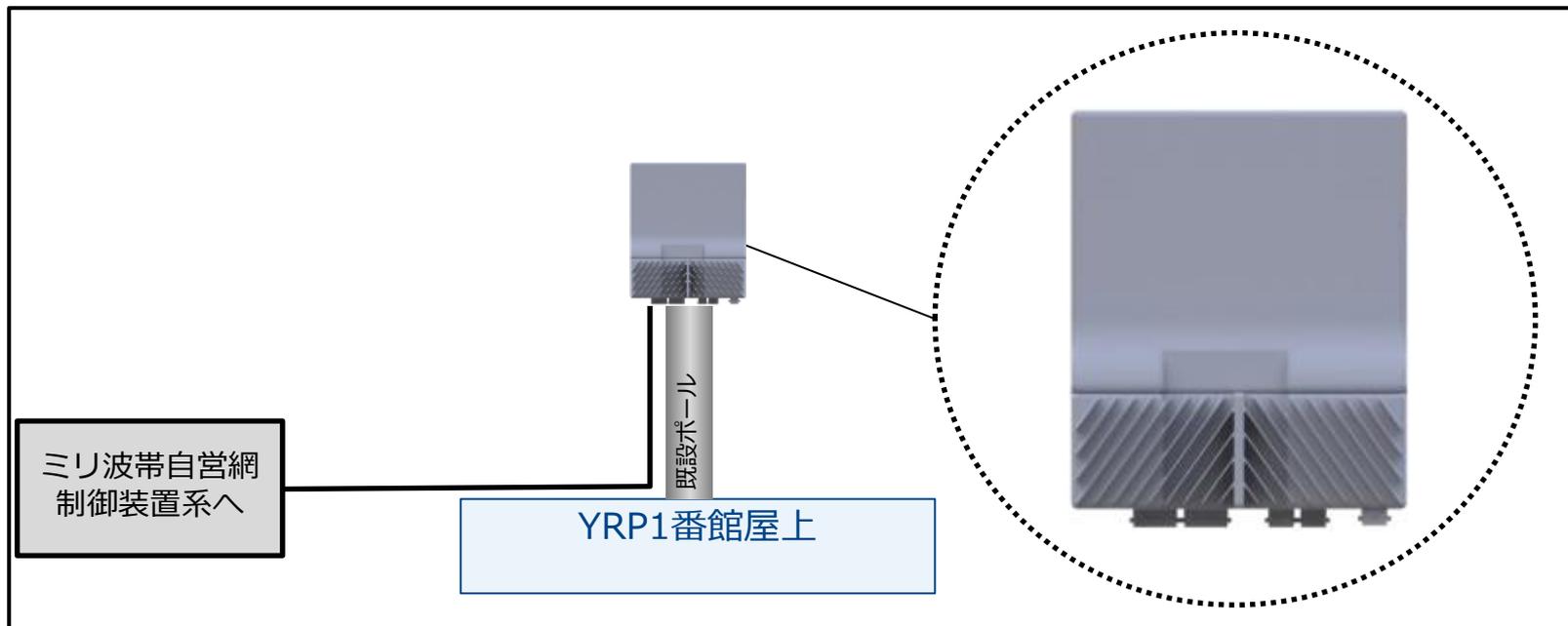
項目	内容		
型式又は名称（ベンダ名）	RAKU Plus【003-200292】（PALCOM）		
周波数	4.74999GHz 4.84998GHz	28.24992～29.05008GHz(60kHz間隔13337波)の中の1波	2585MHz
電波の型式	100M D1A, D1B, D1C, D1D, D1F, D1X, D7W, G1A, G1B, G1C, G1D, G1F, G1X, G7W	100M D1A, D1B, D1C, D1D, D1F, D1X, D7W, G1A, G1B, G1C, G1D, G1F, G1X, G7W	20M0 X1A, X1B, X1C, X1D, X1F, X1X, X7W
空中線電力	0.2W	0.2W	0.4W
アンテナ利得	-	-	-

④ Sub6公衆網模擬基地局システムの屋内局（移動局）



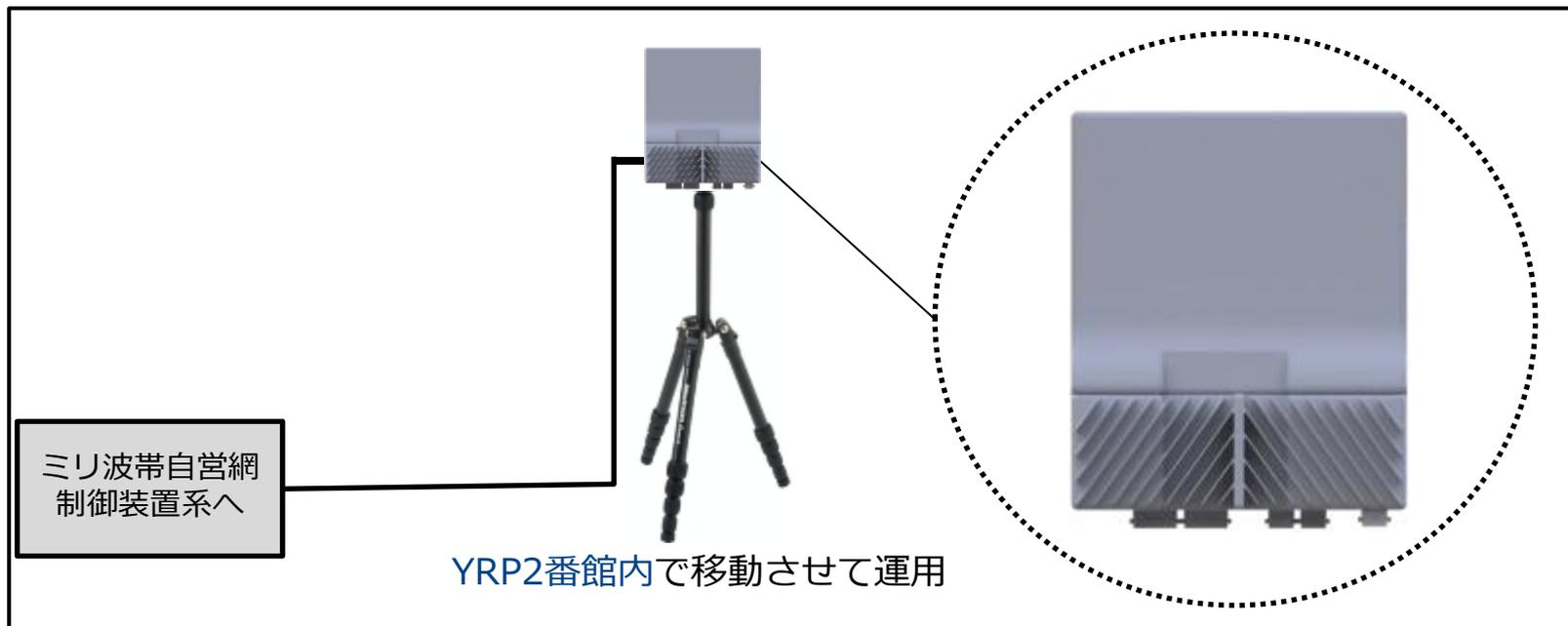
項目	内容
型式又は名称（ベンダ名）	PW-320-DU PW332-pRadio（九州テン）
周波数	4.74999GHz
電波の型式	99M9 X7W
空中線電力	0.01W
アンテナ利得	2.5dBi

⑤ ミリ波帯自営網基地局システムの屋外局（常設局）



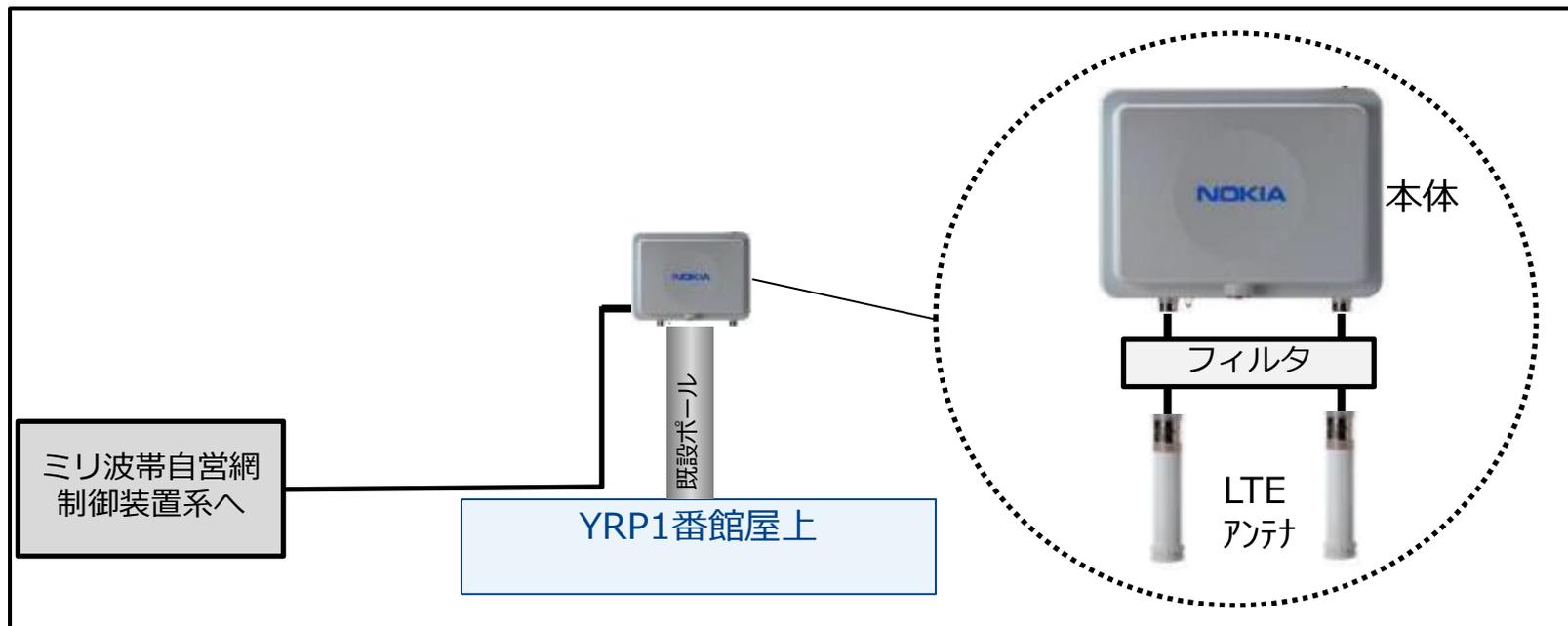
項目	内容
型式又は名称（ベンダ名）	DAASAWEUA-1.6-N20（ノキア）
周波数	28.24992GHz
電波の型式	99M8 X7W
空中線電力	0.126W
アンテナ利得	23dBi

⑥ ミリ波帯自営網基地局システムの屋内局（移動局）



項目	内容
型式又は名称（ベンダ名）	DAASAWEUA-1.6-N20（ノキア）
周波数	28.24992GHz
電波の型式	99M8 X7W
空中線電力	0.126W
アンテナ利得	23dBi

⑦ ミリ波帯自営網基地局システムのLTE局（常設局）



項目	内容
型式又は名称（ベンダ名）	DAFWHT-10-N10（ノキア）
周波数	2585MHz
電波の型式	20M0 X7W
空中線電力	0.311W
アンテナ利得	2dBi

⑧ 評価用5G端末局1～2



項目	内容		
型式又は名称 (ベンダ名)	FMP181L (FCNT)		
周波数	4.74999GHz 4.84998GHz	28.24992~29.05008 GHz(60kHz間隔13337波) の中の1波	2585MHz
電波の型式	100M D1A, D1B, D1C, D1D, D1F, D1X, D7W, G1A, G1B, G1C, G1D, G1F, G1X, G7W	100M D1A, D1B, D1C, D1D, D1F, D1X, D7W, G1A, G1B, G1C, G1D, G1F, G1X, G7W	20M0 X1A, X1B, X1C, X1D, X1F, X1X, X7W
空中線電力	0.2W	0.2W	0.2W
アンテナ利得	-	-	-

性能試験結果

Sub6 試験結果：スループット (DL)

測定対象	スループット
自営網/屋外	平均 234Mbps
自営網/屋内	平均 659Mbps
疑似公衆網/屋内	平均 704Mbps

自営網/屋外

82	[3]	55.0-56.0	sec	30.5	MBytes	256	Mbits/sec	0.238	ms	85047/106797	(80%)↓
83	[3]	56.0-57.0	sec	27.2	MBytes	228	Mbits/sec	0.016	ms	56728/76104	(75%)↓
84	[3]	57.0-58.0	sec	28.6	MBytes	240	Mbits/sec	0.164	ms	65984/86382	(76%)↓
85	[3]	58.0-59.0	sec	27.2	MBytes	228	Mbits/sec	0.019	ms	52272/71689	(73%)↓
86	[3]	59.0-60.0	sec	29.5	MBytes	248	Mbits/sec	0.023	ms	61074/82124	(74%)↓
87	[3]	60.0-61.0	sec	28.9	MBytes	242	Mbits/sec	0.174	ms	66082/86665	(76%)↓
88	[3]	61.0-62.0	sec	27.2	MBytes	228	Mbits/sec	0.205	ms	52847/72258	(73%)↓
89	[3]	62.0-63.0	sec	24.1	MBytes	202	Mbits/sec	0.049	ms	57501/74684	(77%)↓
90	[3]	63.0-64.0	sec	30.0	MBytes	252	Mbits/sec	0.190	ms	61808/83202	(74%)↓
91	[3]	64.0-65.0	sec	27.0	MBytes	226	Mbits/sec	0.051	ms	46842/66087	(71%)↓
92	[3]	65.0-66.0	sec	29.8	MBytes	250	Mbits/sec	0.128	ms	54007/75262	(72%)↓
93	[3]	66.0-67.0	sec	26.0	MBytes	218	Mbits/sec	0.041	ms	63703/82261	(77%)↓
94	[3]	67.0-68.0	sec	27.2	MBytes	228	Mbits/sec	0.006	ms	56516/75916	(74%)↓
95	[3]	68.0-69.0	sec	23.1	MBytes	194	Mbits/sec	0.147	ms	48888/65348	(75%)↓
96	[3]	69.0-70.0	sec	25.9	MBytes	217	Mbits/sec	1.056	ms	58904/77395	(76%)↓
97	[3]	70.0-71.0	sec	28.2	MBytes	237	Mbits/sec	0.110	ms	56290/76432	(74%)↓
98	[3]	71.0-72.0	sec	28.7	MBytes	241	Mbits/sec	0.214	ms	64954/85425	(76%)↓
99	[3]	72.0-73.0	sec	24.9	MBytes	209	Mbits/sec	0.145	ms	55110/72864	(76%)↓
00	[3]	0.0-73.4	sec	2.00	GBytes	234	Mbits/sec	2.121	ms	3420844/4882486	(70%)↓

自営網/屋内

76	[3]	50.0-51.0	sec	85.3	MBytes	716	Mbits/sec	0.030	ms	31425/92284	(34%)↓
77	[3]	51.0-52.0	sec	75.4	MBytes	632	Mbits/sec	0.151	ms	22787/76554	(30%)↓
78	[3]	52.0-53.0	sec	72.9	MBytes	611	Mbits/sec	0.041	ms	18467/70452	(26%)↓
79	[3]	53.0-54.0	sec	75.2	MBytes	631	Mbits/sec	0.028	ms	23738/77409	(31%)↓
80	[3]	54.0-55.0	sec	74.6	MBytes	626	Mbits/sec	0.127	ms	19423/72619	(27%)↓
81	[3]	55.0-56.0	sec	78.4	MBytes	658	Mbits/sec	0.018	ms	19508/75437	(26%)↓
82	[3]	56.0-57.0	sec	78.1	MBytes	655	Mbits/sec	0.038	ms	31787/87496	(36%)↓
83	[3]	57.0-58.0	sec	81.4	MBytes	683	Mbits/sec	0.067	ms	32286/90327	(36%)↓
84	[3]	58.0-59.0	sec	78.9	MBytes	662	Mbits/sec	0.025	ms	26835/83146	(32%)↓
85	[3]	59.0-60.0	sec	82.0	MBytes	687	Mbits/sec	0.028	ms	30755/89215	(34%)↓
86	[3]	60.0-61.0	sec	82.4	MBytes	691	Mbits/sec	0.008	ms	26750/85541	(31%)↓
87	[3]	61.0-62.0	sec	82.8	MBytes	694	Mbits/sec	0.041	ms	24404/83447	(29%)↓
88	[3]	62.0-63.0	sec	77.8	MBytes	652	Mbits/sec	0.024	ms	24626/80106	(31%)↓
89	[3]	63.0-64.0	sec	74.9	MBytes	628	Mbits/sec	0.139	ms	22347/75781	(29%)↓
90	[3]	0.0-64.7	sec	4.96	GBytes	659	Mbits/sec	0.113	ms	1258097/4882821	(26%)↓

疑似公衆網/屋内

73	[3]	48.0-49.0	sec	83.5	MBytes	701	Mbits/sec	0.020	ms	20812/80397	(26%)↓
74	[3]	49.0-50.0	sec	80.9	MBytes	679	Mbits/sec	0.027	ms	19156/76883	(25%)↓
75	[3]	50.0-51.0	sec	82.6	MBytes	693	Mbits/sec	0.025	ms	18874/77764	(24%)↓
76	[3]	51.0-52.0	sec	85.7	MBytes	719	Mbits/sec	0.337	ms	17014/78159	(22%)↓
77	[3]	52.0-53.0	sec	84.9	MBytes	712	Mbits/sec	0.037	ms	17225/77783	(22%)↓
78	[3]	53.0-54.0	sec	84.9	MBytes	713	Mbits/sec	0.172	ms	24764/85353	(29%)↓
79	[3]	54.0-55.0	sec	81.5	MBytes	684	Mbits/sec	0.008	ms	23757/81926	(29%)↓
80	[3]	55.0-56.0	sec	85.3	MBytes	715	Mbits/sec	0.127	ms	21805/82630	(26%)↓
81	[3]	56.0-57.0	sec	81.8	MBytes	686	Mbits/sec	0.250	ms	19291/77658	(25%)↓
82	[3]	57.0-58.0	sec	86.8	MBytes	728	Mbits/sec	0.018	ms	18301/80801	(23%)↓
83	[3]	58.0-59.0	sec	83.2	MBytes	698	Mbits/sec	0.008	ms	23471/82828	(28%)↓
84	[3]	59.0-60.0	sec	85.2	MBytes	714	Mbits/sec	0.014	ms	23770/84523	(28%)↓
85	[3]	60.0-61.0	sec	86.6	MBytes	727	Mbits/sec	0.012	ms	20807/82598	(25%)↓
86	[3]	61.0-62.0	sec	87.7	MBytes	736	Mbits/sec	0.019	ms	22238/84822	(26%)↓
87	[3]	62.0-63.0	sec	81.7	MBytes	685	Mbits/sec	0.031	ms	19726/78011	(25%)↓
88	[3]	63.0-64.0	sec	82.6	MBytes	693	Mbits/sec	0.124	ms	22294/81242	(27%)↓
89	[3]	0.0-64.3	sec	5.27	GBytes	704	Mbits/sec	0.883	ms	1034012/4882812	(21%)↓

Sub6 試験結果：スループット (UL)

測定対象	スループット
自営網/屋外	平均 93.1Mbps
自営網/屋内	平均 157Mbps
疑似公衆網/屋内	平均 129Mbps

自営網/屋外

67	[3]	45.0-46.0 sec	11.7 MBytes	98.3 Mbits/sec	0.331 ms	8980/17343 (52%)↓
68	[3]	46.0-47.0 sec	11.9 MBytes	99.9 Mbits/sec	0.354 ms	8527/17024 (50%)↓
69	[3]	47.0-48.0 sec	11.7 MBytes	98.5 Mbits/sec	0.643 ms	8450/16828 (50%)↓
70	[3]	48.0-49.0 sec	10.1 MBytes	84.4 Mbits/sec	0.697 ms	8286/15465 (54%)↓
71	[3]	49.0-50.0 sec	11.0 MBytes	92.6 Mbits/sec	0.310 ms	10746/18621 (58%)↓
72	[3]	50.0-51.0 sec	11.4 MBytes	95.6 Mbits/sec	0.365 ms	8313/16440 (51%)↓
73	[3]	51.0-52.0 sec	11.3 MBytes	94.6 Mbits/sec	0.127 ms	9597/17641 (54%)↓
74	[3]	52.0-53.0 sec	11.9 MBytes	99.6 Mbits/sec	0.337 ms	8460/16933 (50%)↓
75	[3]	53.0-54.0 sec	11.9 MBytes	99.7 Mbits/sec	0.980 ms	8564/17038 (50%)↓
76	[3]	54.0-55.0 sec	11.1 MBytes	93.1 Mbits/sec	0.441 ms	8989/16904 (53%)↓
77	[3]	55.0-56.0 sec	12.3 MBytes	103 Mbits/sec	0.287 ms	8780/17543 (50%)↓
78	[3]	56.0-57.0 sec	11.3 MBytes	94.6 Mbits/sec	0.523 ms	8230/16277 (51%)↓
79	[3]	57.0-58.0 sec	11.6 MBytes	97.1 Mbits/sec	0.344 ms	8807/17064 (52%)↓
80	[3]	58.0-59.0 sec	11.7 MBytes	98.1 Mbits/sec	0.409 ms	8633/16972 (51%)↓
81	[3]	59.0-60.0 sec	10.8 MBytes	90.8 Mbits/sec	0.441 ms	8126/15844 (51%)↓
82	[3]	0.0-60.5 sec	672 MBytes	93.1 Mbits/sec	0.130 ms	541185/1020222 (53%)↓

自営網/屋内

70	[3]	43.0-44.0 sec	19.6 MBytes	164 Mbits/sec	0.024 ms	2975/16954 (18%)↓
71	[3]	44.0-45.0 sec	19.8 MBytes	166 Mbits/sec	0.089 ms	2828/16976 (17%)↓
72	[3]	45.0-46.0 sec	19.4 MBytes	163 Mbits/sec	0.682 ms	3308/17164 (19%)↓
73	[3]	46.0-47.0 sec	19.4 MBytes	163 Mbits/sec	0.842 ms	3388/17251 (20%)↓
74	[3]	47.0-48.0 sec	17.9 MBytes	150 Mbits/sec	0.057 ms	2815/15606 (18%)↓
75	[3]	48.0-49.0 sec	18.9 MBytes	159 Mbits/sec	0.119 ms	4354/17836 (24%)↓
76	[3]	49.0-50.0 sec	19.0 MBytes	159 Mbits/sec	0.887 ms	3585/17135 (21%)↓
77	[3]	50.0-51.0 sec	18.4 MBytes	154 Mbits/sec	0.129 ms	3673/16797 (22%)↓
78	[3]	51.0-52.0 sec	19.9 MBytes	167 Mbits/sec	0.051 ms	3052/17236 (18%)↓
79	[3]	52.0-53.0 sec	16.6 MBytes	139 Mbits/sec	0.046 ms	4860/16675 (29%)↓
80	[3]	53.0-54.0 sec	17.2 MBytes	145 Mbits/sec	0.077 ms	4780/17070 (28%)↓
81	[3]	54.0-55.0 sec	17.0 MBytes	143 Mbits/sec	0.055 ms	4779/16897 (28%)↓
82	[3]	55.0-56.0 sec	18.2 MBytes	152 Mbits/sec	0.066 ms	4197/17155 (24%)↓
83	[3]	56.0-57.0 sec	19.0 MBytes	159 Mbits/sec	0.017 ms	3534/17089 (21%)↓
84	[3]	57.0-58.0 sec	19.2 MBytes	161 Mbits/sec	0.141 ms	3278/16993 (19%)↓
85	[3]	58.0-59.0 sec	18.7 MBytes	157 Mbits/sec	0.187 ms	3587/16922 (21%)↓
86	[3]	59.0-60.0 sec	15.7 MBytes	132 Mbits/sec	0.341 ms	4567/15797 (29%)↓
87	[3]	0.0-60.3 sec	1.11 GBytes	157 Mbits/sec	0.886 ms	212765/1020277 (21%)↓

疑似公衆網/屋内

68	[3]	43.0-44.0 sec	14.3 MBytes	120 Mbits/sec	0.328 ms	5130/15352 (33%)↓
69	[3]	44.0-45.0 sec	14.3 MBytes	120 Mbits/sec	0.684 ms	7594/17830 (43%)↓
70	[3]	45.0-46.0 sec	11.2 MBytes	94.2 Mbits/sec	0.733 ms	6854/14862 (46%)↓
71	[3]	46.0-47.0 sec	10.5 MBytes	87.8 Mbits/sec	0.786 ms	9853/17317 (57%)↓
72	[3]	47.0-48.0 sec	15.4 MBytes	129 Mbits/sec	0.266 ms	8512/19521 (44%)↓
73	[3]	48.0-49.0 sec	17.0 MBytes	143 Mbits/sec	0.262 ms	4989/17113 (29%)↓
74	[3]	49.0-50.0 sec	11.7 MBytes	97.8 Mbits/sec	0.447 ms	5644/13964 (40%)↓
75	[3]	50.0-51.0 sec	15.6 MBytes	131 Mbits/sec	0.356 ms	8322/19464 (43%)↓
76	[3]	51.0-52.0 sec	11.6 MBytes	97.0 Mbits/sec	0.376 ms	5530/13778 (40%)↓
77	[3]	52.0-53.0 sec	8.49 MBytes	71.2 Mbits/sec	0.363 ms	10026/16082 (62%)↓
78	[3]	53.0-54.0 sec	10.5 MBytes	88.1 Mbits/sec	0.320 ms	12569/20059 (63%)↓
79	[3]	54.0-55.0 sec	14.3 MBytes	120 Mbits/sec	0.660 ms	7423/17599 (42%)↓
80	[3]	55.0-56.0 sec	9.14 MBytes	76.7 Mbits/sec	0.450 ms	7156/13675 (52%)↓
81	[3]	56.0-57.0 sec	9.28 MBytes	77.8 Mbits/sec	0.387 ms	10769/17388 (62%)↓
82	[3]	57.0-58.0 sec	9.82 MBytes	82.4 Mbits/sec	0.379 ms	9720/16723 (58%)↓
83	[3]	58.0-59.0 sec	10.0 MBytes	84.2 Mbits/sec	0.915 ms	11304/18467 (61%)↓
84	[3]	59.0-60.0 sec	13.3 MBytes	111 Mbits/sec	0.272 ms	10392/19862 (52%)↓
85	[3]	0.0-60.2 sec	927 MBytes	129 Mbits/sec	1.286 ms	358694/1020215 (35%)↓

mmW 試験結果：スループット（屋内 RRH②）

測定対象	スループット
DL	最大 199Mbps
UL	最大 52.6Mbps

DL

```

5] local 192.168.254.100 port 61962 connected to 192.168.254.100 port 50760
5] local 192.168.225.30 port 5201 connected to 192.168.254.100 port 50760
ID] Interval Transfer Bandwidth Jitter Lost/Total Datagrams
5] 0.00-1.00 sec 18.6 MBytes 156 Mbits/sec 0.297 ms 151/2538 (5.9%)
5] 1.00-2.00 sec 22.8 MBytes 191 Mbits/sec 0.425 ms 39/2962 (1.3%)
5] 2.00-3.00 sec 22.1 MBytes 186 Mbits/sec 0.151 ms 0/2830 (0%)
5] 3.00-4.00 sec 23.5 MBytes 197 Mbits/sec 0.313 ms 0/3009 (0%)
5] 4.00-5.00 sec 22.0 MBytes 185 Mbits/sec 0.204 ms 141/2961 (4.8%)
5] 5.00-6.00 sec 23.3 MBytes 195 Mbits/sec 0.212 ms 85/3068 (2.8%)
5] 6.00-7.00 sec 23.4 MBytes 196 Mbits/sec 0.256 ms 0/2990 (0%)
5] 7.00-8.00 sec 23.6 MBytes 198 Mbits/sec 0.124 ms 0/3017 (0%)
5] 8.00-9.00 sec 23.3 MBytes 195 Mbits/sec 0.684 ms 1/2983 (0.034%)
5] 9.00-10.00 sec 23.7 MBytes 199 Mbits/sec 0.201 ms 0/3033 (0%)
5] 10.00-10.32 sec 7.38 MBytes 197 Mbits/sec 3.194 ms 0/945 (0%)
-----
ID] Interval Transfer Bandwidth Jitter Lost/Total Datagrams
5] 0.00-10.32 sec 0.00 Bytes 0.00 bits/sec 3.194 ms 417/30341 (1.4%)
    
```

UL

```

5] local 192.168.254.100 port 5201 connected to 192.168.241.130 port 39194
ID] Interval Transfer Bandwidth Jitter Lost/Total Datagrams
5] 0.00-1.00 sec 3.95 MBytes 33.1 Mbits/sec 4.550 ms 0/506 (0%)
5] 1.00-2.00 sec 4.77 MBytes 40.1 Mbits/sec 1.564 ms 0/611 (0%)
5] 2.00-3.00 sec 6.27 MBytes 52.6 Mbits/sec 0.982 ms 0/802 (0%)
5] 3.00-4.00 sec 3.77 MBytes 31.6 Mbits/sec 2.856 ms 0/483 (0%)
5] 4.00-5.00 sec 5.03 MBytes 42.2 Mbits/sec 2.833 ms 48/692 (6.9%)
5] 5.00-6.00 sec 4.41 MBytes 37.1 Mbits/sec 1.800 ms 126/691 (18%)
5] 6.00-7.00 sec 3.41 MBytes 28.6 Mbits/sec 1.578 ms 185/622 (30%)
5] 7.00-8.00 sec 4.95 MBytes 41.5 Mbits/sec 1.003 ms 384/1017 (38%)
5] 8.00-9.00 sec 6.05 MBytes 50.8 Mbits/sec 1.931 ms 98/873 (11%)
5] 9.00-10.00 sec 5.59 MBytes 46.9 Mbits/sec 5.068 ms 0/716 (0%)
5] 10.00-11.00 sec 3.60 MBytes 30.2 Mbits/sec 4.434 ms 0/461 (0%)
5] 11.00-11.52 sec 800 KBytes 12.7 Mbits/sec 9.042 ms 0/100 (0%)
-----
ID] Interval Transfer Bandwidth Jitter Lost/Total Datagrams
5] 0.00-11.52 sec 0.00 Bytes 0.00 bits/sec 9.042 ms 841/7574 (11%)
    
```