

Cellular Coverage Survey

Skyline Community College



November 13, 2022

Executive Summary

Signal coverage for all 3 of the major operators is nearly non-existent for the majority of the campus. This data confirms user observations that we encountered during our walk test where students and staff commented that it was nearly impossible to initiate a call when on campus. The entire campus is a prime candidate for a distributed antenna system (DAS) to remedy this condition and with the proper design and installation, full coverage can be brought into each building.

Results:

Cellular coverage for all 3 of the operators was very poor across the entire campus. When considering the usability of the cellular signal there are two primary factors to consider: signal strength and signal quality. There are conditions where a signal is very strong, but due to external interference, or other network conditions, the cell signal is noisy. In this case, even though there is a strong RF condition, the phone will be unable to accurately decode the signal, resulting in a poor user experience. On the other hand, there also might be conditions where the signal is weak, but if the quality of the signal is still good, then the phone has a chance at successfully setting up a call. However, there is a practical limit to this low signal condition and it is clear that Skyline campus is well below the threshold needed to set up and maintain a cellular connection.

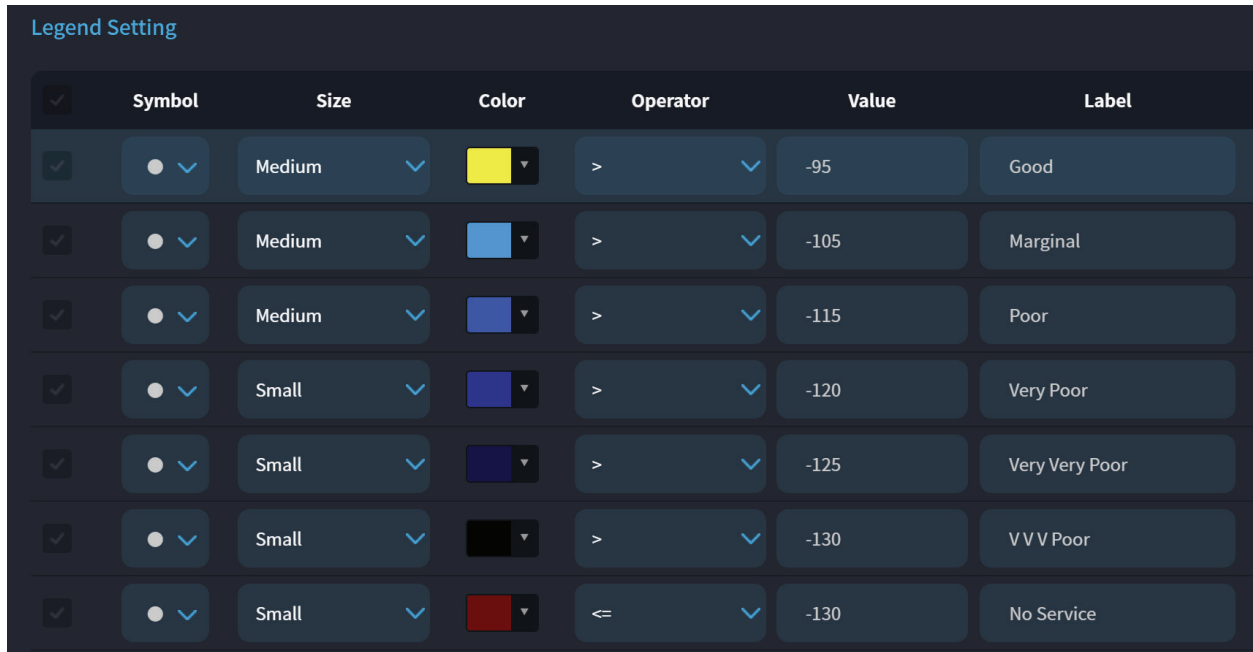
Consider that signal strength follows the scale below:



All 3 of the major operators -- Verizon, ATT, T-Mobile -- have coverage around -120 dBm, with many buildings below -130. This data was collected using a scanning receiver, a piece of test equipment that is much more sensitive to signal strength when compared to a commercial cell phone. This means that a

phone will usually have a bottom end of -125dBm whereas the scanner can detect signals down to -140dBm. Figure 1 below shows the average RSRP value for each building.

For the following report we established the legend for the signal strength according to these settings:



✓	Symbol	Size	Color	Operator	Value	Label
✓	●	Medium	Yellow	>	-95	Good
✓	●	Medium	Light Blue	>	-105	Marginal
✓	●	Medium	Blue	>	-115	Poor
✓	●	Small	Dark Blue	>	-120	Very Poor
✓	●	Small	Dark Purple	>	-125	Very Very Poor
✓	●	Small	Black	>	-130	V V V Poor
✓	●	Small	Red	⇐	-130	No Service

It should be noted that typically we establish the bottom end of the legend at -115, but in the case of Skyline, I had to extend this much lower in order to provide some segregation of colors in the maps. For the labels I simply added some words to help you categorize these new low signal classifications.

Spectrum utilization:

Verizon operates with 4 channels: 751MHz, 884.9 MHz, 1985 MHz, and 2120 MHz.

ATT operators with 3 channels: 739MHz, 1950 MHz, 2132.5 MHz

T-Mobile operates with 4 channels: 866.3 MHz, 1970 MHz, 1992.5 MHz, and 2145 MHz.

Skyline College

		Verizon				ATT			TMO			
Building	Floor	751	884.9	1985	2120	739	1950	2132.5	866.3	1970	1992.5	2145
1	1A	-115	-121	-127	-127	-107	-119	-137	-128	-125	-138	-133
1	1	-126	-130	-133	-133	-119	-129	-138	-135	-130	-134	-135
1	2	-121	-124	-132	-132	-111	-124	-138	-134	-125	-138	-132
1	3	-121	-124	-129	-131	-107	-118	-134	-132	-121	-135	-130
2	1	-127	-129	-134	-135	-116	-128	-141	-134	-133	-135	-135
2	2	-115	no signal	-138	-142	no signal	-141	no signal	-138	no signal	-138	-144
2	3	-115	-116	-123	-121	-105	-116	-135	-131	-118	-138	-126
3	1	-130	-133	-140	-139	-126	-128	no signal	-138	-133	-138	-139
3	2	-128	-129	-135	-134	-116	-124	-141	-138	-133	no signal	-138
B3P-3A	1	-116	-118	-129	-118	-99	-107	-134	-134	-121	no signal	-126
B3P-3B	1	-119	-117	-129	-122	-98	-107	-133	-134	-121	no signal	-126
B3P-3C	1	-121	-119	-132	-124	-101	-109	-138	-133	-122	-137	-128
B3P-3D	1	-123	-127	-134	-132	-107	-119	-136	-134	-128	no signal	-133
B3P-3E	1	-117	-121	-130	-126	-106	-117	-137	-133	-128	-135	-132
B3P-3F	1	-119	-120	-128	-127	-105	-118	-136	-128	-129	-138	-132
4	1	-127	-131	no signal	-137	-122	-132	no signal	no signal	-134	no signal	-137
4	2	-126	-128	no signal	-137	-116	-126	no signal	no signal	-133	no signal	-137
4	3	-125	-128	-133	-132	-113	-124	no signal	no signal	-131	no signal	-135
5	1	-125	-127	-138	-135	-115	-128	no signal	no signal	-131	no signal	-136
5	2	-115	-116	-126	-129	-105	-119	-137	no signal	-122	-130	-129
6	1	-128	-121	-136	-133	-110	-121	-138	-132	-124	no signal	-131
6	2	-122	-113	-131	-132	-104	-113	-136	-132	-114	-135	-122
7	1	-126	-125	-131	-126	-106	-118	-133	-131	-120	-134	-127
7	2	-123	-123	-130	-125	-104	-112	-135	-137	-115	-135	-123
7	3	-120	-122	-130	-128	-106	-116	-137	-131	-120	-135	-128
8	1	-123	-122	-134	-139	-110	-121	-139	no signal	-125	-136	-130
8	2	-120	-117	-133	-133	-110	-125	-137	-129	-131	-137	-133
8	3	-113	-109	-117	-117	-103	-113	-129	-127	-118	-10	-122
9	1	-114	-113	-132	-129	-106	-117	-136	-134	-123	-135	-124
10	1	-113	-112	-131	-131	-104	-118	-137	-128	-124	-136	-126
11	1	-111	-112	-133	-130	-104	-120	-139	-129	-125	-136	-130
12	1	-109	-112	-114	-109	-93	-105	-127	-126	-122	-123	-112
14	1	-121	-115	-130	-122	-101	-109	-135	-131	-117	-136	-122
15	1	-121	-122	-130	-128	-106	-113	-134	-136	-125	-136	-130
16	1	-114	-112	-122	-121	-98	-109	-128	-133	-120	-136	-124
17	1	-118	-129	-125	-118	-112	-122	-139	-133	-132	-138	-137
18	1	-120	-116	-120	-125	-103	-112	-135	-129	-124	-136	-128
19	1	-117	-118	-132	-129	-104	-119	-136	-133	-125	-134	-128
20	1	-102	-102	-118	-111	-87	-98	-120	no signal	-106	-121	-112
21	1	-119	-118	-124	-125	-99	-116	-135	-128	-125	-142	-126
22	1	-126	-126	-131	-133	-114	-129	no signal	-134	-132	no signal	-135
23	1	-124	-124	-132	-131	-114	-126	-138	-132	-130	no signal	-133
24	1	-119	-122	-127	-131	-112	-127	-137	-131	-132	no signal	-133
Outdoor		-110	-107	-118	-116	-97	-107	-130	-130	-116	-126	-118

Figure 1 – Summary of results by operator